# Chemical Week-



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October 3, 1959

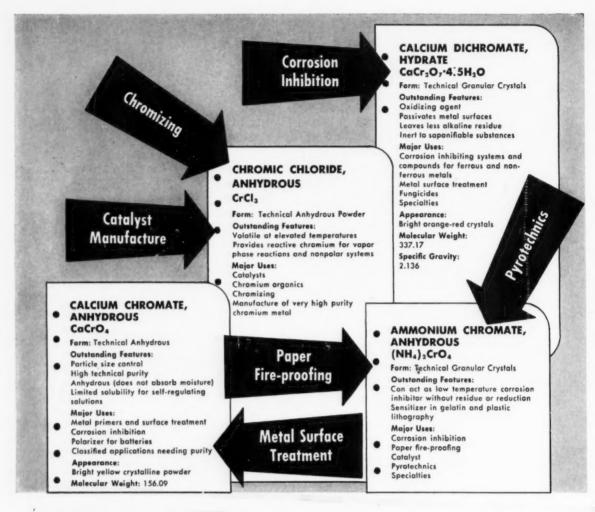
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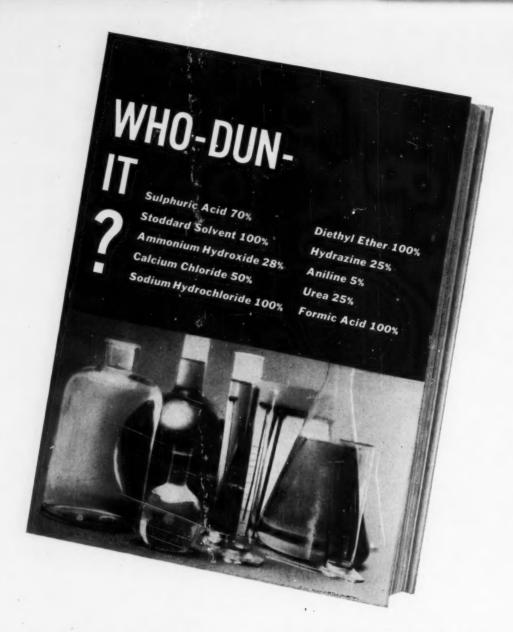
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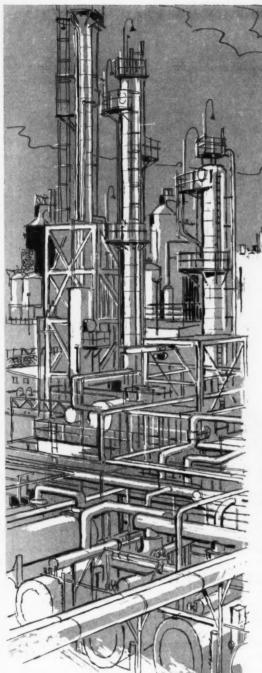
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# BEHIND THE NEWS

# An Award and an Honor

AN EXTENSIVE REPORT on the activities of the Chemical Divisions of Food Machinery & Chemical Corp. is one of the features of this issue. And while we have published similar reports in depth on other chemical firms, this one is special: FMC is the winner of the first award for management achievement presented by CHEMICAL WEEK.

When we first established this award, as a parallel to the one for chemical engineering achievement (CW, March 7, p. 21), we announced it as "The Chemical Week Award for Management Achievement." But as the date for the retirement of CW's editorial director, Sidney D. Kirkpatrick, approached, we have chosen to honor him by hereafter calling it "The Kirkpatrick Award for Management Achievement."

In Christopher Marlowe's words, "Honor is purchas'd by the deeds we do." Many have honored Sid for aiding the progress and growth of the chemical process industries, for his judgment on industry problems and policies, and for his efforts in behalf of the nation in war and peace. We honor him for these reasons, and, additionally, for the mature wisdom that has guided us in the practice of business journalism.

The selection of the winner of the first Kirkpatrick management award was made by a distinguished panel of judges, representing the financial community, the graduate schools of business, and management consultants: Serving with Chairman Walter G. Whitman of the Massachusetts Institute of Technology were Richard B. Schneider, Empire Trust Co.; Roland P. Soule, Irving Trust Co.; Francis S. Williams, Chemical Fund; Robert Paul Brecht, Wharton School, University of Pennsylvania; Georges F. Doriot, Harvard Business School; Hoke S. Simpson, Graduate School of Business, Columbia University; and consultants H. B. Maynard, Robert F. Moore and Arthur J. Slade.

Of the 22 companies nominated for the award, 14 submitted presentations for the award committee's consideration. In three cases, committee members requested additional data from companies.

Following a luncheon at which the "jury" debated companies' merits, the formal votes were submitted by mail. And while, in the first ballots received, three companies were "neck and neck," the final tally showed four judges giving FMC first place, and two others listing it second.

For a penetrating look at the award winner, turn to p. 36.

Marlan F. Draudly

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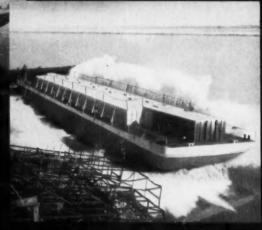


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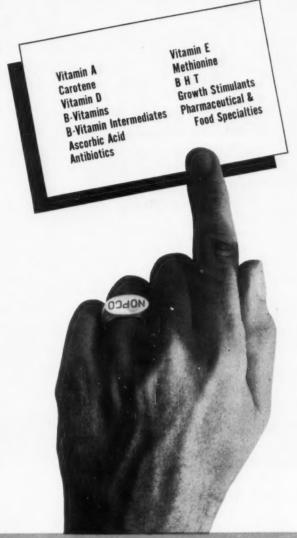
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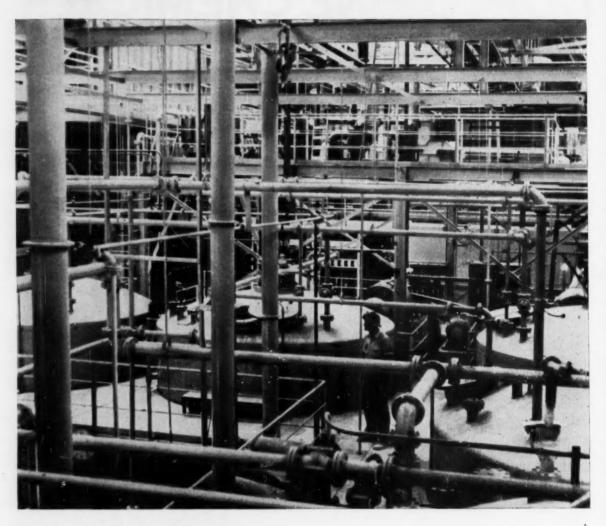


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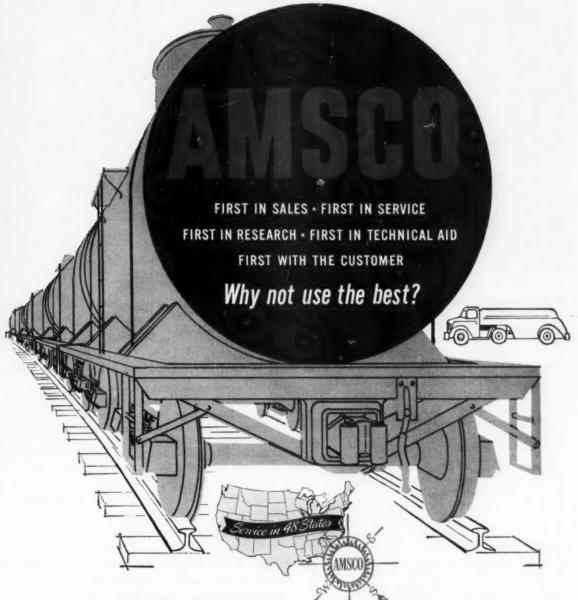
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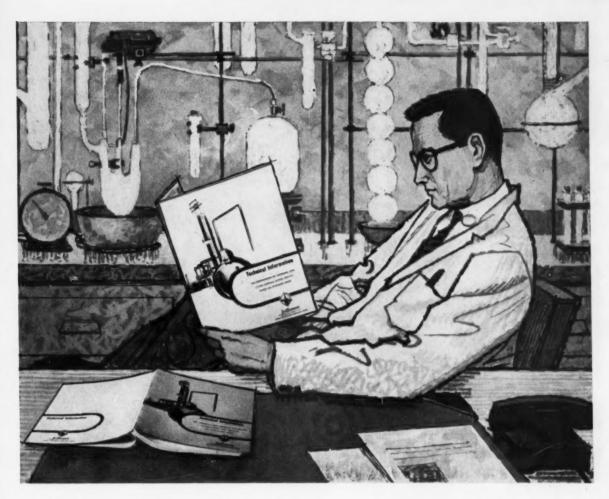
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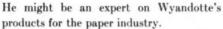
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For a pictorial presentation of Wyandotte technical service at work, please turn the page.

\*Chemists, Chemical Engineers, Physicists, etc., whose industrial or research experience qualifies them as specialists in their particular field.



SODA ASH • CAUSTIC SODA • BICARBONATE OF SODA • CALCIUM CARBONATE • CALCIUM CHLORIDE • CHLORINE • MURIATIC ACID • HYDROGEN • DRY ICE • GLYCOLS SYNTHETIC DETERGENTS (anionic and nonioric) • SODIUM CMC • ETHYLENE OXIDE • ETHYLENE DICHLORIDE • POLYETHYLENE GLYCOL • PROPYLENE OXIDE PROPYLENE DICHLORIDE • POLYPROPYLENE GLYCOL • DICHLORODIMETHYLHYDANTOIN • CHLORINATED SOLVENTS • OTHER ORGANIC AND INORGANIC CHEMICALS

# Choosing the best grade of bicarb



. . an example of Wyandotte technical service at work



1 "The bicarb we are now using," writes a West Coast producer of packaged baking goods, "appears to be the cause of brown spots in our cakes and biscuits. I sincerely hope you can help us." A sample of this bicarb was mailed to us under separate cover. This inquiry puts our technical service to work.



2 Laboratory screen analysis found both large particles and fines in the sample. A uniform product, with a controlled range of particle size, was needed. Samples of two grades, Wyandotte Better Blend Soda® and U.S.P. fine granular, were sent to the customer for evaluation and approval, along with a report.



3 The customer's plant superintendent visits Wyandotte's bicarb manufacturing facilities to see first-hand how these products are made. The technical service man shows him the various processes, pointing out how this optimum range of particle size in Wyandotte sodium bicarbonate is achieved and controlled.



4 Delicious! The technical service man follows up to make sure that the product has performed satisfactorily. He samples the new product . . . finds to his delight that the cake is high, light and tender, with uniform texture . . . a treat to the taste . . . and proof, in the eating, of a job well done.

# Wyandotte

Pacing progress with creative chemistry
724 To

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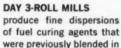
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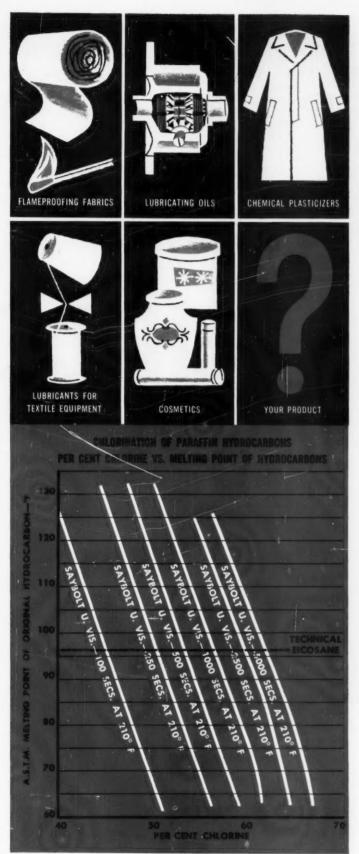




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contact: J. E. Johanson, Manager, Industrial Development,

UNION ELECTRIC CO., St. Louis 1, Mo.



Leti get apample et RB

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It can be readily chlorinated to yield a product with outstanding stability characteristics, as illustrated by the chart at left. In addition to being more stable, chlorinated eicosane has a lower viscosity for a given percentage of chlorine than paraffin wax.

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# **Business**

# Newsletter

CHEMICAL WEEK
October 3, 1959

A big plug for synthetic fertilizers, but no change in official East-West chemical trade policies—that about sums up what Premier Khrushchev's U.S. tour means for CPI companies.

The Soviet premier's belief in chemical fertilizers was emphasized in his visit last week to an Iowa hybrid corn farm. But despite his frequent pitches for trade (he again stressed chemical technology deals), Khrushchev apparently touched this subject very lightly during his three-day conference with President Eisenhower.

Khrushchev may have left behind a glow of "peace and friend-ship." If it doesn't quickly fade in the harsh light of reality, it could encourage deals on the part of U.S. businessmen who have so far been deterred by public relations considerations.

Actually, West German businessmen may reap the biggest benefits from an apparent relaxation of East-West tensions. Even though they sent 18% of their total chemical equipment exports to the Soviet bloc last year, some of them complain that pressures from the government have caused them to lose orders, particularly to the British.

Latest British deal with the Soviet bloc: Imperial Chemical Industries (London) has agreed to supply Poland with know-how and a license to build a polyester fiber plant; ICI will also sell Poland the fiber (Terylene) until the plant is in full operation. It's ICI's first know-how sale to a Communist country—although its chemical sales to eastern Europe have been rising. A similar deal with the U.S.S.R. has been in the talking stage on and off for at least two years, but it is snagged on a price disagreement.

There's little likelihood of a shutdown order for Escambia Chemical at Pace, Fla., declares Plant Manager Albert New (CW Business Newsletter, Sept. 26). He tells CW that the fertilizer and nitric acid plant on Escambia Bay (near Pensacola) has always kept ammonia compounds in its effluent close to the 50 ppm. originally set as the standard by Florida's state board of health.

Not long ago, the state lowered this limit to 30 ppm., creating new problems for both Escambia and neighboring Columbia-National, which allegedly releases substantially larger concentrations of ammonia compounds into the bay. (C-N Plant Manager August Meinrath's only comment on this point is that "a nationally known consulting firm" is working on the problem.)

New has adjusted his plant's effluent to the new standard, proposes to the board of health that he will reroute it into a single outflow. The board feels that his plan doesn't go far enough, wants Escambia also to build a pipeline into the bay. This, New believes, is not necessary.

# **Business**

Newsletter

(Continued)

The campaign against use of maleic hydrazide on tobacco has collapsed—but not in time to prevent this year's sales of the chemical, MH-30 (which prevents growth of suckers on tobacco plants), from dropping an estimated 25%. Farmers who did not use the chemical this year now say they'll use it next year "regardless of contrary advice from tobacco leadership" (CW, May 30, p. 24). This fall, tobacco on which MH-30 was used sold at high prices; and of this tobacco, yield was reportedly increased as much as 250-300 lbs./acre.

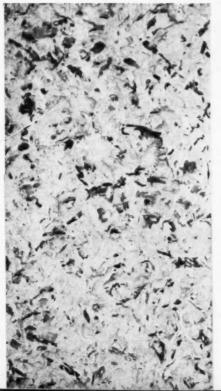
Sales of MH-30 dropped off as much as 33% in North Carolina-South Carolina areas, where the threat to its use was posed. But U.S. Rubber's Naugatuck Chemical Division—developer and producer of the chemical—reports that in some areas of Georgia and Florida sales picked up. Weather influenced the decline of MH-30 consumption in the Carolinas: severe early drought was followed by six weeks of rain. Farmers couldn't apply MH-30 in the wet weather—even if they wanted to.

An attack on government plans to negotiate tariff cuts on a group of chemicals was launched last week by the Synthetic Organic Chemical Manufacturers Assn. The government's Interdepartmental Committee on Trade Agreements will hold public hearings this month on the proposed cuts, and has published a list of the products to be considered, including fatty acids and alcohols, dicalcium phosphate, ink and ink powders. SOCMA, in a statement by President S. G. Baker, asserts that each of the chemicals listed (except dicalcium phosphate) is really a "basket," encompassing a group of chemicals and representing several industries. It will be impossible for domestic producers to determine the effect of the proposed cuts unless a new public announcement is issued, listing specific products, the statement asserts.

Texas Gulf Sulphur Co. to share in the lithium market? The company is continuing tests to determine whether or not to take up its option on more than 1,000 acres of lithium-bearing spodumene ore reserves owned by Basic Atomics, Inc., between Lincolnton and Bessemer City, N.C. It is also testing Basic Atomics' refining process, which eliminates the need to decrepitate the ore. Major lithium producers say that following expiration of government lithium purchase contracts, a 35% sales increase per year would be necessary to warrant entrance of another producer. But rapidly expanding industrial uses may push sales up 25% this year, it is now estimated.

DCAT has a new president and also a new name. Newly elected is William W. Huisking, president, Charles L. Huisking Co., Inc. (New York). And the association, formerly known as Drug, Chemical and Allied Trades Section of the New York Board of Trade, is now the Drug, Chemical & Allied Trades Assn. It remains affiliated with the Board of Trade.

# BORDEN BORDEN BORDEN CHEMICAL DEVELOPS A NEW RESIN



# FOR PARTICLE BOARD

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BORDEN CHEMICAL

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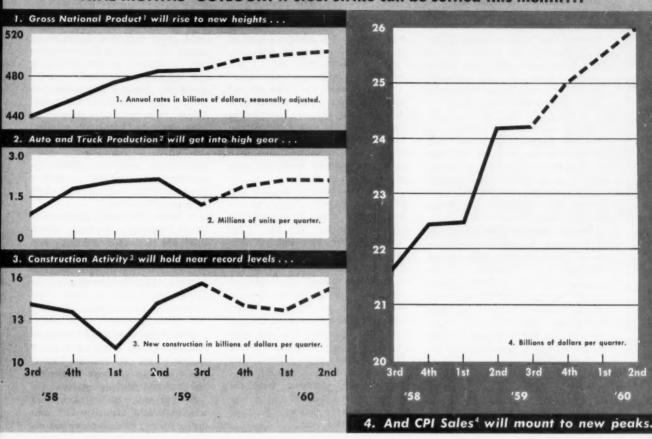
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Veek

# NINE MONTHS' OUTLOOK: If steel strike can be settled this month...



# After the Strike, a New Upsurge

The business boom that began early in 1959 now looks as though it will last at least until next summer—and CPI sales are expected to rise with the general business tide. This, even if the steel strike drags on for another month or more.

Chemical company executives, by and large, are optimistic on prospects for the next nine months—and even more so for the longer term. Undeniably, the steelworkers' walkout—which has idled nearly 90% of the nation's basic steel capacity for 2½ months—has started to pinch the U.S. economy, including a growing number of CPI concerns.

But so far, these adverse effects have been relatively minor and localized; and the Eisenhower Administration is convinced that there's still enough steel in warehouses to keep U.S. industry as a whole running at almost full tilt for another couple of months.

**Prosperity Regardless:** All things considered, the consensus of industry and government experts this week is this:

• If the steel strike is settled within a few weeks, the over-all business upturn will spurt in this fourth quarter, then keep climbing—though not so steeply—in next year's first and second quarters. CPI sales should run a parallel course (see charts, above).

· And even if there's no settle-

ment this month, the upswing may still follow about the same pattern—but on a different timing. Odds are that a continued stalemate in steel labor negotiations would bring a Taft-Hartley court order for an 80-day back-to-work movement; and that by then, a combination of governmental, market and public opinion pressures would virtually force steel management and union bargainers to sign a contract fairly promptly.

Countervailing Forces: With diverse economic forces at work, it's clear that chemical companies will be affected in sharply different ways this fall. Sales by some of these companies—such as Union Carbide, Wyandotte Chemicals and others—al-

ready have been hit by the steel stoppage. Other large companies acknowledge they're bound to suffer if the strike continues through this month.

And the monetary situation—variously described in such terms as "tight money" and "high interest"—is touching CPI companies in varying degrees. One large producer of fertilizer materials says its customers are asking for more credit and longer terms; a major chemical distributor in the West notes "more pressure on suppliers to finance transactions."

Furthermore, the steel industry isn't the only one with current labor problems. Copper producers are down now, aluminum producers will have to deal with multiplant contract demands as soon as the steel strike is settled, and numerous chemical companies are heading into new wage-and-hour bargaining.

Strong Consumer Demand: Nevertheless, there are substantial grounds on which to base predictions for better-than-ever business in the months ahead. In fact, the government's top economic advisors now predict that the upsurge will be robust enough to yield a \$100-million surplus in the federal budget for the fiscal year ending next June 30.

For one thing, personal income has been rising steadily all this year, putting a sturdy support under consumer demand. And—somewhat surprisingly—construction is holding up despite the tighter money problem. Some decline in house building is expected next year; but construction of all kinds should continue at high levels.

Auto Output: Betting now is that the auto industry—an important customer for CPI products—will be able to go right ahead on production of 1960 models, with near-record output forecast for the nine-month period just starting. Advisors close to Labor Secretary James Mitchell feel there's enough steel available to keep all auto companies in business for two months or more, although possibly at reduced operating levels.

Several chemical concerns are fairly confident about prospective business levels for the next three quarters. One company dealing in solvents and industrial chemicals says it expects "at least" a 25% increase during the next nine months over last year's corresponding period. Another com-

pany reports that sales this past summer were more than 30% better than last year's, and looks for a steadily rising sales volume for the next nine months. "After that," a spokesman said, "things will level off."

A major chemical firm prefers not to confine its optimism to the next nine months. The summer's business was good, an executive told *CW*, "and we believe 1960 and '61 will be unusually bright years, sales-wise."

Strike Pinched: The strike has hurt some, of course—e.g., shipments of mineral acids are off. Nevertheless, the dip is smaller than outsiders have been guessing. One important producer says that its sulfuric sales have been "exceptionally good" this summer.

In short, chemical business has been nicked only slightly by this longest steel strike in history (one sales manager says only two of his 7,000 customers have trimmed their purchases because of the strike, and their cuts amounted to less than 1% of his total volume). And chemical companies-along with most other industries-are counting on a definite pickup in business as soon as the steel mills start up again. Says one highranking economist who worked on the Budget Bureau's latest preview: "The economy is doing beautifully, even with the steel shutdown. When the strike is over, this will add a very great impetus, so that we'll be doing even better next year."

# FTC Antibiotics Finale?

Next week, the Federal Trade Commission's antitrust action (CW, Sept. 26, p. 26) against five tetracycline producers and distributors will roll into what appears to be the last stage of hearings on the main charges.

After a week's recess, the case reopens next Monday in the New York Bar Assn. building. Scheduled as the first witness: Pfizer President John McKeen. After his testimony, executives and scientists from the four other respondent companies—American Cyanamid's Lederle Laboratories, Bristol-Myers, Upjohn and Olin Mathieson's Squibb Division—will take the stand.

Conclusion of the defense won't necessarily mean an end to the legal wrangling. If the FTC finally rules against the defendants, they are expected to appeal, possibly all the way up to the Supreme Court.

Last week, testimony focused on Pfizer's tetracycline patent, which the FTC charges was fraudulently obtained with the aid of the other producers.

Pfizer's key witnesses last week:

- Fred Tanner, Pfizer microbiologist, who ran two fermentations (under U.S. Patent Office orders) to help determine whether tetracycline was inherently coproduced with the previously patented chlortetracycline (Lederle's Aureomycin). The Patent Office—believing that coproduction took place—had been ready to reject Pfizer's application for that reason.
- Virgil Bogert, Pfizer organic chemist, who used three different recovery methods to determine whether Tanner's broths contained tetracycline in recoverable form.
- Robert Woodward, Loeb professor of chemistry at Harvard. Woodward was retained by Pfizer to help determine the chemical structure of its earlier broad-spectrum antibiotic, Terramycin. (Another member of the Terramycin structure team was Lloyd Conover, who subsequently discovered tetracycline.)

Results Questioned: FTC contends that the affidavits submitted by Pfizer to describe the results of the Tanner-Bogert experiments were incomplete and contained misrepresentations.

In their testimony last week, both scientists stated that they had conducted the experiments under instructions drawn from Lederle's chlortetracycline patent and from three then-pending applications in the tetracycline field.

Bogert said he could find no tetracycline. In his affidavit, he had stated that his testing procedure was not exact, and that 10% tetracycline content — although not recoverable — should be assumed.

Woodward testified that Conover's discovery of tetracycline was truly an invention, and not obvious knowledge.

Another witness for Pfizer, Eugene Genisse—retired member of the Patent Office's Board of Appeals—testified on Patent Office practice. He discussed the rule of law that made it "legally improper" for Patent Examiner Herbert Lidoff (who considered the Conover application) to cite a subsequent application as providing knowledge rendering Conover's discovery unpatentable.

# **Pushing Plastics Prospects to New Highs**

A new spate of expansion projects, plus latest readings on growing use of plastics in various new applications, this week is raising major producers' sights. They now call "conservative" an industry prediction—propounded just one week ago—that U.S. plastics output will double by 1970.

By 1965, one leading resin producer told CW, production will hit close to 8 billion lbs.; and by 1970, domestic output might soar to 11 billion lbs., compared with the 5 billion lbs. now tentatively tallied for '59.

Bolstering such optimism are plans set forth last week for still another round of plant construction by resin makers:

• Union Carbide completed plans for an additional 170 million lbs./year of conventional high-pressure polyethylene resin capacity at two Texas plants (Seadrift and Texas City)—to bring the company's total polyethylene molding material capacity to more than 550 million lbs./year. By next Jan. 1, estimated U.S. total will be 1,400 million lbs./year.

 Reichhold Chemicals Inc. said it has ordered equipment for a phenolic molding material plant to be located on one of two sites still under consideration in the East. The plant will be the first of a number planned.

• Texas Eastman Co., division of Eastman Kodak, has stepped up polypropylene production so that "commercial quantities on a limited basis" are now available. The company has been producing pilot-plant quantities at Longview, Tex., for about a year. Extrusion and molding grades in natural and colors are now available at competitive prices, according to the company.

These moves closely followed Phillips Chemical's plans to boost ethylene capacity by 35 million lbs./year to meet growing polyethylene market potential, and Shell's plans to produce polystyrene in an idle American Cyanamid plant at Wallingford, Conn. (CW Business Newsletter, Sept. 26).

The step-up in plastics production is expected to encompass nearly all major plastics in the next 10 years; these materials are gaining respect as engineering materials and in other large-volume uses.

As the industry sees it today, here's

where plastics can more than double their total sales in the next decade:

• Construction uses of plastics alone are predicted to skyrocket from an estimated 500 million lbs. in '59 to nearly 2 billion lbs. in 10 years.

 All types of packaging—this year consuming 1 billion lbs. of synthetic materials—should reach at least 2 billion lbs.

• Plastics in appliances, electrical and electronic applications are expected to go from 1.2 billion to 2.5 billion lbs.

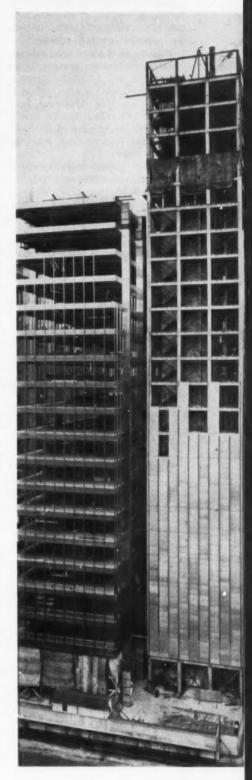
 Automotive uses may rise from 120 million lbs. (15-30 lbs./car, depending on the model) to a whopping 250 million lbs.

The Building Boost: Revised building codes, improved, high-strength resins, and combinations of resins with conventional building materials, all are expanding resin producers' hopes for greatly increased use of plastics in construction. The trend toward prefabrication is augmenting use of the sandwich panel (see photo, right). And a "new-old" material that may edge into structural applications in the near future—fire-resistant polystyrene—is reported to be in development stages.

Meanwhile, expanded polystyrene is one of the materials getting top billing in rigid foams used in construction, aircraft and boats; while rigid urethane foams are expected to increase at least 10-fold from their relatively small 10-million-lbs. sales this year. And a newcomer to watch for in the foam field: phenolics for insulation.

Packaging Pickup: A 20% increase is now expected this year in plastics for packaging applications; but in the decade to come, even greater increases are forecast, especially in soft and dry goods and in-store packaging of produce, meats and cheeses. Resin variations will continue to multiply, with almost each application requiring a "tailored" resin. For instance, Union Carbide Plastics Co. says it now has more than 100 polyethylene resins on the market. Each year it drops about one-third of the list, replacing those products with

New Chicago building augurs quadrupled use of plastics in 10 years.



new or improved types of resins.

Intensified market research on polystyrene is resulting in a steady growth curve—an example of what can happen to a "mature" plastic material. One company reports its sales up 17% this year, and a major producer can foresee a 50% sales growth for its polystyrene in a 10-year period. (Polystyrene sales reached 450 million lbs. last year. This year, sales of about 550 million lbs. are anticipated, with steady gains of 60 or 70 million lbs./year forecast over the next 10 years.)

Although polyethylene's spectacular growth curve will eventually taper, industry officials look for output of 1.6 billion lbs. in 1960, against 1.2 billion lbs. in sales this year. And increasing the markets for both polyethylene and polypropylene will be "polyblends" (polyethylene with polypropylene) and copolymers of ethylene and propylene, especially in low-cost tires. On the other hand, high-density polyethylene sales will not exceed 110 million lbs. this year (capacity is estimated at about 350 million lbs.). However, huge market growth is foreseen in blown bottles and films; and already the high-density polyethylene detergent bottle is becoming commonplace.

And vinyls, too, which headed the list of plastics in volume sales up to last year, are still seen as a "growth market"—this year's sales are expected to reach 975 million lbs., against 850 million lbs. last year. A big market booster for vinyls as well as for other polymers could be the long-awaited development of a satisfactory exterior latex paint. Several companies now report success after extensive testing, and exterior latextype surface coatings could add several million pounds to resin output in the next few years.

Also to Be Watched: The effect of the one-shot process for flexible ure-thane foam recently revealed by Allied Chemical's National Aniline Division. This process—which eliminates slab wastes ranging up to 25% by enabling production of a contoured, molded cushion in one step—cuts cost to the point where, producers say, urethane could compete even with hair and cotton in upholstery. Also, Allied's new flameproof urea resin could open a new market in the lighting fixture field for an older, some-

what lagging plastic material.

Perhaps the most outstanding example of what happens to a market when a plastic material catches on is the pleasure boat field. The most conservative growth estimate now is 20% yearly. Using the Society of the Plastics Industry's figure of 72,000 glass fiber boats produced in 1958, this would mean an output of 300,000 boats by 1965.

# Boranes: "Hot Stand-by"

Borane high-energy fuels and the Callery Chemical Co. are down, but haven't yet been counted out. Here's how the situation stands after last week's Defense Dept. ruling on the plants idled by cancellation of triethyl decaborane fuel production plans. (CW, Aug. 22, p. 21):

The Navy's \$38-million, 5-tons/-day plant at Muskogee, Okla., contracted to Callery, will be kept on a "hot stand-by" basis through at least June '60. It will be kept intact and "ready to resume operations" on about three months' notice.

Next year, the Pentagon will decide whether rocket engines will need enough borane fuel to justify keeping the plant on stand-by status. The Air Force and Callery are now negotiating a contract to define the plant's "hot" status.

The Air Force's 0.8-ton/day pilot plant at Lewiston, N.Y., operated by Olin Mathieson, will be kept in operation to supply borane fuels for research and development work "until a lower-cost source becomes available." Pentagon R&D requirements through '60: 150,000 lbs. of pentaborane, 6,000 lbs. of decaborane.

The Air Force's \$45-million, 5-tons/day plant at Model City, N.Y., also operated by Olin Mathieson, will be partially dismantled. Boron trichloride facilities will be activated to feed the Lewiston pilot plant. The pyrolizer unit will probably be pulled out and installed at the Muskogee plant, and the Air Materiel Command has been directed to close the idle sections of the plant and to "investigate the uses which could be made for all or part" of it.

Behind the Decisions: Last week's decisions were based on recommendations made Sept. 11 by the Pentagon's joint working group on special fuels—composed of seven private ad-

visors to Herbert F. York, director of defense research and engineering. The group's recommendations were based on Arthur D. Little's 60-day process-evaluation study of the two rival borane plants.

Several points made in the ADL study lie behind the decision to scrap the plant at Model City and keep the one at Muskogee.

Operating at ultimate, or reduced, capacity, the Muskogee plant will produce diborane (80% of the total fuel cost) at less cost than the Model City plant could. Moreover, ADL reported, the Callery plant has "greater flexibility for intermittent operation and for operation at less than rated capacity." It can be run economically at 10% of capacity, compared with 35% for the Olin Mathieson plant.

And the Muskogee plant is in "a greater state of readiness," could be restored to full operation following a period of stand-by at a much smaller cost than could the Model City plant.

The Muskogee plant—unlike Model City's—doesn't have the capacity to produce pentaborane and decaborane fuels designed for rocket uses, probably because Callery's process calls for ethylating the diborane before pyrolyzing it to form triethyl decaborane. Olin Mathieson pyrolyzes first and then ethylates. But the necessary facilities could be added "at a fraction of" the \$4-5 million yet required to bring the Model City plant to the "level now attained" by the Muskogee plant.

The outlook for boranes is still cloudy. They have been virtually written off as fuels for air-breathing engines—even though some experts had held that their big future was in ramjets. The Pentagon is still interested in the boranes' potential in liquid or solid rocket fuel; so, from now on, military-supported research will be directed toward fuel uses rather than toward production improvements.

The shutdowns haven't yet touched current borane fuel research and development contracts. But the ADL study recommended that present contracts should be terminated in an orderly manner—the cost of continuing them is small compared with the value of potential discoveries.

In the borane R&D field right now: Stauffer-Aerojet, AFN (American Potash-Food Machinery-National Distillers venture), Olin Mathieson, Callery.

# COMPANIES

Borne Chemical Co. (New York) has acquired all the outstanding stock of The Wright Co. and its subsidiary, The By-Products Co. (Landover, Md.). Wright produces large cast acrylic sheets; the subsidiary fabricates those sheets into skylights. T. E. Betner, Borne president, said polychemical product expansion by The Wright Co. is planned, with Lyle Wright, founder, continuing management of the acquired companies.

Intercontinental Chemical Corp. (New York) will build new headquarters in Mountainside, N.J., for three affiliates: Carbic-Hoechst Corp., Hostachem Corp. and Hostawax Co., technical representatives and distributors for West Germany's Farbwerke Hoechst AG. Executive offices for Intercontinental and Hoechst Pharmaceuticals will remain in New York.

Arizona Fertilizers Inc. (Boulder, Colo.) has changed its name to Arizona Fertilizer & Chemical Co., and has organized a wholly owned subsidiary, Cortez Chemical Co.

Tennessee Products and Chemical Corp. (Nashville, Tenn.) has been forced to make a second major cutback in production of ferroalloys as a result of the steel strike. Three additional furnaces have been shut down at the Rockwood Roane electric furnace plant. Previously affected: Rockwood blast furnace and Chattanooga ferroalloy plant, and Tenn-Tex alloy plant (Houston, Tex.).

# EXPANSION

**Barite:** United States Glass and Chemical Corp. (Tiffin, Ohio) plans construction of a \$500,000 mill near Dierks, Ark., to produce barite for weighted drilling mud and other outlets. Initial production: 35,000 tons/year; by-product production, 250,000 tons/year of various types of commercial gravel. The mill is expected to be in operation in seven months.

Petrochemicals: Collier Carbon and Chemical Corp. has taken an option on 300 acres in Contra Costa county near Rodeo, Calif., for expansion of carbon black and petrochemical facilities.

Nickel: International Nickel Co. of Canada, Ltd., has scheduled startup of its new mining project at Thompson, Manitoba, for 1960. Full-scale production of nickel at an annual rate of 75 million lbs./year is set for '61. Inco's Manitoba project reportedly will be the world's first fully integrated nickel plant.

Glass Fiber: Pittsburgh Plate Glass Co. will expand its glass-fiber yarn plant at Shelby, N.C., from 16 to

24 furnaces; 12 furnaces are now in production. The plant ultimately will have a 40-million-lbs./year textile yarn capacity. Completion date; within 12 months.

Packaging: Olin Mathieson Chemical Corp. has launched a two-year, \$12-million expansion at West Monroe, La., to broaden its line of packaging products. Included: a semichemical pulping system, and other improvements ranging from lumber operations to packaging equipment. A \$30-million chemical expansion was announced in August.

# FOREIGN

Aluminum/Africa: Kaiser Aluminum has accepted a Ghana government invitation to form an international group to build an aluminum smelter near the Kosombo and Volta rivers. This plant would operate on power from the \$180-million Volta River hydroelectric project.

**Exports/Italy:** Italy exported \$117.3 million in chemicals during the first half of this year, compared with \$98 million in first-half '58. Pharmaceutical exports rose 5.5%, to \$11.7 million, and pharmaceutical imports dropped 2.1%, to \$18.4 million.

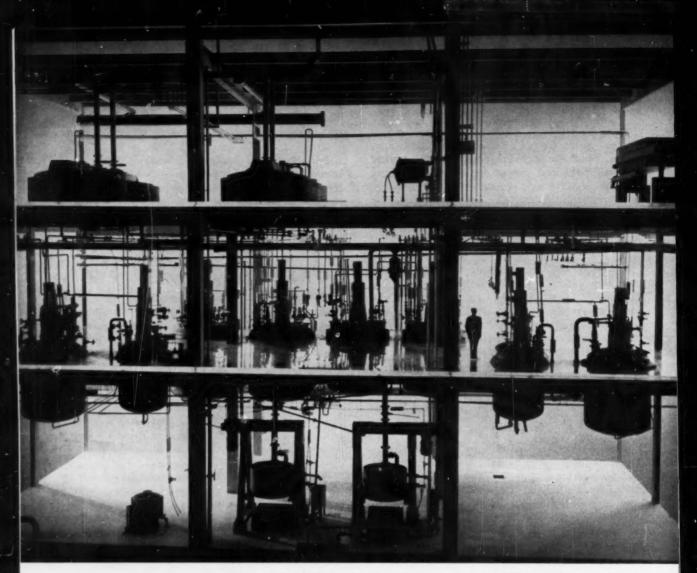
**Petrochemicals/Italy:** ENI, the state oil monopoly, has decided to build a petrochemical complex at its Gela, Sicily, fields. Details haven't been revealed. Last week, ENI's second offshore well at Gela hit oil.

Sales/Germany: Farbenfabriken Bayer registered a 20% sales increase during the first eight months of '59.

Polycarbonates/Japan: Teikoku Rayon and its affiliate, Kunoshima Chemical, have formed a new joint venture, Teijin Chemical, to produce polycarbonate resins and other synthetic organic chemicals in a \$2.3-million, 5-tons/day plant in Mihara. Kunoshima has been producing polycarbonate at its pilot plant on the same site.

Chemicals/Argentina: Borax Holdings Ltd., British parent of U.S. Borax and Chemical Corp., has expanded its Argentine operations by acquiring B. Winstone y Hijos, a producer of printing inks and industrial paints and finishes. Borax, which has large borate ore reserves in South America, also recently built an ore refining plant in Argentina.

Pharmaceuticals/Argentina: The government recently approved several expansion outlays by U.S. pharmaceutical companies: Mead Johnson, \$303,848; G. D. Searle, \$200,000; Merck, \$117,666. A British firm, Glaxo Laboratories, received permission to invest \$830,869; and a French company, Laboratories Francaises de Chimiotérapie, \$7.5 million.



This is a scale model of a section of a dye plant now being built by Kellogg for Toms River-Cincinnati Chemical Corporation. It is a typical example of Kellogg's ability to design with models to clients' process schemes.

# **NEW LIGHT ON AN OLD PROBLEM**

PROBLEM: Provide chemical companies with ways to: (1) minimize capital investments in new plants; (2) shorten the time between plant planning and plant production; (3) assure optimum design and operating efficiency.

SOLUTION: Kellogg-developed scale models, such as the one shown above, used as engineering and design tools.

For an increasing number of The M.W. Kellogg Company's clients in the chemical and petroleum refining industries, scale models have proved to be a many-sided solution to the economics of engineering and constructing new production facilities. This is especially true in regard to piping—a major investment in any process plant.

Built by Kellogg's designers, these

three-dimensional blueprints eliminate planning studies and piping key plans, improve designs, facilitate approval, promote faster construction and lower operating costs. They replace conventional drawings of over-all layout and piping. Photographs of the models are used instead of these drawings. The models themselves are used on the job site to save time in explaining construction details to workers and for use in

training operators to run the plant.

Kellogg's model techniques and economics, as they apply to the whole plant, are described in a reprint of the 12-page Kelloggram No. 5, available on request. For those specifically interested in Kellogg's developments in process piping, also ask for the 24-page reprint of a recent Kellogg article in the chemical press, "How and When to Use Plastic Pipe".

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# Washington

# Newsletter

CHEMICAL WEEK October 3, 1959 The Senate investigation of drug prices starts Nov. 30 and will run intermittently for several months. First subject: prices and possible antitrust practices in connection with the corticosteroid hormones—cortisone, hydrocortisone, prednisone and their derivatives—which are used in treatment of arthritis and other ailments. Principal hormone makers: Merck, Schering, Upjohn.

Senator Estes Kefauver (D., Tenn.) and his antitrust subcommittee are primed with information on drug price and patient policies and on industry ownership and control patterns. He is particularly interested in banks and investment houses that own shares of more than one drug company. He will ask whether financiers use their positions to restrict industry competition.

Records have been subpoenaed from five big banks, including New York's Chase Manhattan, Morgan Guaranty, and Bankers Trust, and a dozen investment companies and mutual funds. The Securities & Exchange Commission conducted an extensive survey on stock ownership at Kefauver's request. The committee then went after minutes of board meetings, memos, and similar documents. Records of 20 pharmaceutical firms have also been subpoenaed. Committee counsel John Blair says: "This was no fishing expedition; we went after specific items."

First hearings will highlight the committee's findings on specific products—antibiotics, hormones, diabetic drugs, tranquilizers and vitamins. Company officials will be called.

Second, general hearings are scheduled, in which industry representatives will have a chance to present the over-all industry case. Dr. Austin Smith, representing the Pharmaceutical Manufacturers Assn., will testify. But so will representatives of such industry opponents as Consumers Union.

The hearings are bound to produce a new public relations problem for the industry. Company and brand names will be used freely. The committee will point out that after-tax drug manufacturing profits (10.1% of sales last quarter) are the highest of any industry included in the SEC-FTC report. Dr. Smith says PMA will try to show that—by different methods of calculation—some other industries have higher profits. PMA's board of directors will meet soon to map strategy.

Kefauver doesn't intend to involve his group with advertising and promotion policies. These are under the jurisdiction of the Commerce Committee. But his staff acknowledges that these will inevitably figure in the hearings.

The investigation is aimed at drawing headlines. Kefauver set the keynote when he pointed out that 10 million Americans suffer from rheumatic diseases and that many of these are old people on small pensions.

# Washington

# Newsletter

(Continued)

The type of rebuttal that industry will make is apparent. Speaking last week in St. Louis before the National Assn. of Retail Druggists, Harry J. Loynd, president of Parke, Davis, pointed out that since '45 the cost of living has risen 60% but drugs have gone up only 37%. He noted that "no one likes to buy drugs" and urged a general campaign to straighten out the public's "misconceptions."

Restraint in medical research spending has been ordered by the President, according to reliable sources. A letter to Secy. Arthur S. Flemming says, in effect, "Don't spend any more than you have to."

The hold-down is part of the effort to show a budget surplus this year. The latest Budget Bureau estimate predicts a thin surplus of \$100 million—which could easily be wiped out if the steel strike isn't settled within two weeks.

Congress boosted Eisenhower's budget request for medical research by 25%, from \$295 to \$400 million for the National Institutes of Health. The appropriation contained a saving clause, stating that the President doesn't have to use it all unless it can be spent "effectively." The Administration claims it can't be spent without taking medical personnel away from other necessary pursuits, although some officials privately disagree with this analysis.

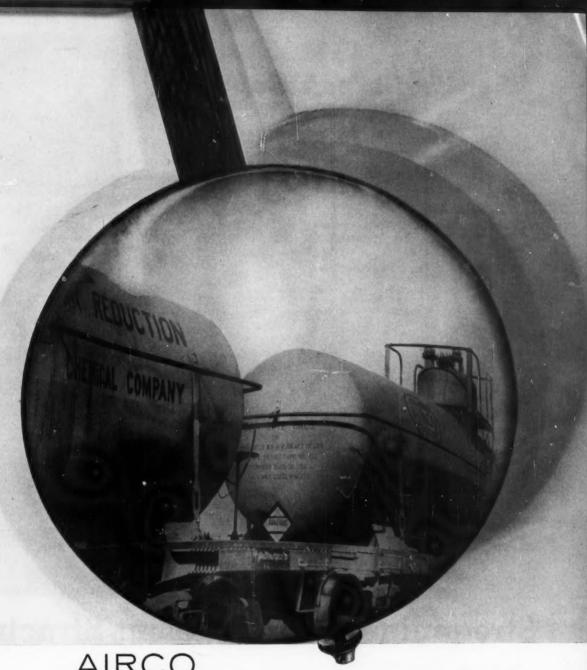
Need for information to help U.S. business compete abroad against the Soviet bloc has aroused White House interest.

Chamber of Commerce President Erwin D. Canham told the President a better system is needed to get nonclassified Soviet trade information to American businessmen. The President said he "thought very well" of the idea and instructed economic advisor Don Paarlberg to follow up with chamber officials.

The number of persons receiving academic degrees will double in 10 years. This is the gist of a new report by the Office of Education. The predicted increase applies to Bachelors, Masters and Ph.D.'s in all fields. The increase will be due both to population growth and to a higher proportion of students seeking degrees—the first being the more important factor.

Three Soviet books on air pollution, translated but not yet published, show that the Russians are apparently more advanced than the U.S. in precise measurement of pollution and study of biological effects. The translations were done by B.S. Levine, retired Public Health Service official.

Another translation just published describes the engineering phase of Soviet air pollution control as it stood in '55. It is Levine's translation of "Sanitary Protection of Atmospheric Air," by V.N. Uzhov, may be purchased for \$3 from Office of Technical Services, U.S. Dept. of Commerce.



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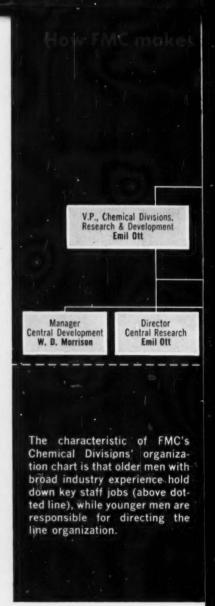
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# Chemical Week Report: FMC—first winner of Kirkpatrick Award



Executive committee (clockwise from I., Ott, Jacobson, Vernon, Prutton, Williams, Gilbert, Loeffler) meets monthly to plan, survey progress of chemical operations.



# Streamlined Management Structure

The seven men pictured above make up the executive committee of Food Machinery and Chemical Corp.'s Chemical Divisions. At their regular monthly sessions, they consider current problems and chart future growth. But last week's meeting was different; they looked at their record. What they saw was something to glow about:

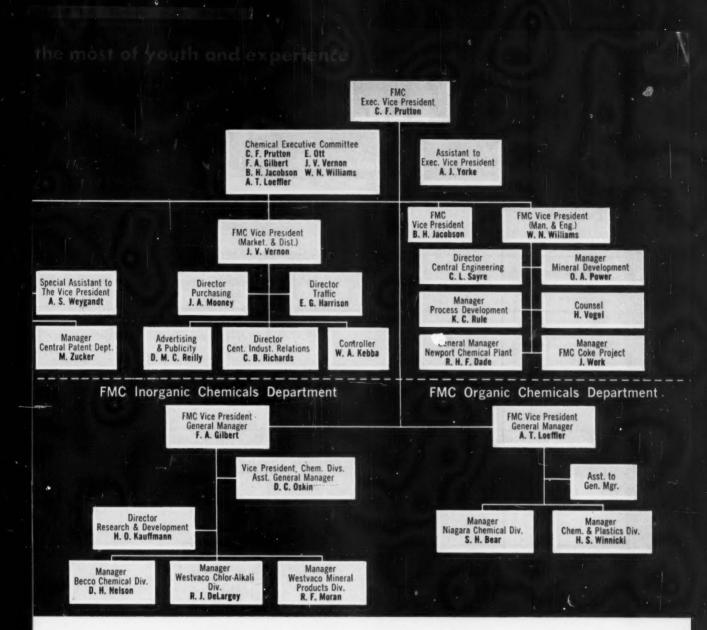
• An effective, revitalized management group. The management structure of the Chemical Divisions underwent major surgery a year ago last April. This week, after a thorough examination, a board of outside specialists pronounced the operation a complete success (see p. 9).

• Sales at a record high. Last year, FMC's chemical sales amounted to \$135.6 million. Indications are that they will top \$151 million this year.

 Profits definitely climbing. The corporation has never broken profits down by divisions. But Chemical Divisions' sales comprise 42% of the total; profits probably account for a comparable percentage. Last year, FMC's profits came to \$16.5 million or \$2.38/share. Financial men expect this year's to be \$2.85-2.90/share. Record—or near record—chemical profits will doubtless swell the total.

• Technological-managerial gambles paying off at attractive odds. Included: installation of four phosphorus furnaces at Pocatello, Ida.; a multimillion-dollar project to produce soda ash from trona at Green River, Wyo.; a \$15-million investment in new chlorine cells and continuous processes for making carbon bisulfide and carbon tetrachloride at Chlor-Alkali's South Charleston, W. Va., plant; a process improvement program for Becco that has improved the economics of its "electrolytic" hydrogen peroxide process to a point where management feels it's fully competitive with known "organic" processes.

New projects promise to sweeten the kitty even more. In an advanced stage of development is a method of coking "noncoking" coal for phosphorus furnace use. This, management believes, will not only stand the phosphorus



# **Sets Fast Chemical Growth Pace**

field on its ear but will also have repercussions elsewhere. A development program on Dapon diallyl phthalate resin (purchased from Shell several years ago) has spawned a broad line of monomers and related resins. This project is so encouraging that a new plant is planned. In addition, a series of new epoxy resins has been developed to a semi-commercial stage. Research liaison with half-FMC-owned Petro-Tex could yield a whole new growth field based on Petro-Tex products as petrochemical building blocks.

In Three Parts: In short, as far as its chemical operations are concerned, FMC has never had it so good. But the road to recognition in the chemical industry is long and precarious. And for a while, it looked as though FMC wouldn't make it.

Perhaps the real secret of the company's success has been an ability to recognize mistakes and start over, if necessary. The best way to appreciate this is to look at its chemical operations from three standpoints: how it obtained a chemical base; how it built upon that base; and, finally, how it superimposed a management structure that integrated the chemical parts into an effective whole.

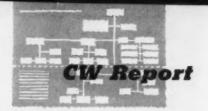
#### **Buying a Chemical Base**

During World War II FM started making amphibious troop carriers and in the process picked up a vigorous ordnance group. The step into chemical manufacture seemed a logical extension of its food processing and agricultural equipment lines—one that would help the company diversify and fatten profits at the same time. The upshot of this thinking was the purchase, in 1943, of Niagara Sprayer & Chemical Co.

Unquestionably, Niagara was a good buy. Its sales at the time of purchase were approximately \$5 million, on which it earned \$780,000—before taxes. Food Machinery paid \$2.1 million for it. Niagara made inorganic insecticides—lead and calcium arsenates, copper compounds,

# How FMC built its chemical base

Year	Purchase	Joint Venture	Reason
1943	Niagara Sprayer & Chemical		Food Machinery was selling farming equipment. Niagara's agricultural chemicals were a logical choice for the firm's entrance into the chemical field.
1945 1949	Coastal Chemical		Both Coastal and Michemco made agri- cultural chemicals, were absorbed by Niagara.
1948	Westvaco		Niagara was basic in inorganic insecticides but the trend was toward organics. Westvaco gave it a captive source of DDT, BHC. It also gave the company caustic and chlorine, large deposits of phosphorus and trona. Corporate name changed to Food Machinery and Chemical.
1951	Ohio-Apex		O-A's plasticizers gave FMC an outlet for Westvaco's phosphorus chlorine.
1951		Intermountain Chemical (80% FMC; 20% National Distillers. Later changed to 90% FMC)	Company formed to produce soda ash from trona.
1952	Buffalo Electro- Chemical		Becco gave FMC a position in hydrogen peroxide.
1954	Fairfield plant of National Distillers		FMC acquired a plant to make pyreth- rins, piperonyl butoxide.
1955		Petro Tex (50% FMC, 50% Tennessee Gas Transmission)	FMC took over government butadiene plant, got a partner (TGT) basic in petrochemicals.
1957		AFN (50% owned by American Potash, 25% each by FMC and Na- tional Distillers)	Company formed to explore high-energy, boron-based fuels.
1958	Sunland Industries		Niagara's marketing sphere extended to California's San Joaquin Valley.
1958		50% FMC; 50% National Dis- tillers	Company formed to promote FMC's Dimazine unsymmetrical dimethyl hydrazine.
1959		50% Allied; 50% FMC	Allied, big user of carbon tetrachloride, obtained half interest in FMC's carbon bisulfide and tetrachloride plants.



ground sulfur and ground sulfur products-and nicotines.

Since Food Machinery did a thriving business selling machinery to farmers, Niagara's insecticides fit snugly into the firm's marketing pattern. Flushed with success, the company purchased two other agricultural chemicals makers: Coastal Chemical Co. (in 1944) and Michemco Inc. (in 1949). Both were absorbed into Niagara.

But although Niagara was basic in inorganic insecticides, the postwar trend was to organics and the division found itself rapidly losing its position. The company rectified that in 1948 by taking over Westvaco Chemical Corp., which made DDT and BHC. In addition, Westvaco was an important supplier of chlorine and caustic soda. It also had a position in wet-process phosphoric acid, made carbon bisulfide and tetrachloride, owned extensive reserves of trona and phosphates.

In recognition of the importance of the Westvaco acquisition, the company's name was changed in the same year to Food Machinery and Chemical Corp.

FMC soon found out how one thing leads to another in the chemical industry. In purchasing Westvaco it was assured of captive supplies for some of Niagara's products. Its next purchase—Ohio-Apex—was to gain captive outlets for some of Westvaco's products. Ohio-Apex was an important producer of plasticizers, including phosphates—an outlet for Westvaco's phosphorus and chlorine. It also makes aluminum chloride, another market for Westvaco's chlorine. Of its 35-plus products, five contained phosphorus, 14 contained chlorine.

The next major acquisition was Buffalo Electro-Chemical in 1952. The rationale for this move is by no means as clear-cut as that for the previous purchases. Becco's forte was making hydrogen peroxide; its manufacturing and marketing techniques differed radically from those of the rest of the company. But it was a solid company in every respect and did broaden FMC's chemical base. Like the other acquisitions, moreover, it was examined—and found sound—from an investment standpoint.

In any case, FMC reverted to a more logical pattern in 1954, when it took over the Fairfield plant of National Distillers. This makes pyrethrins (insecticide) and piperonyl butoxide (synergist) and other organic chemicals.

Its latest acquisition took place last year, when it bought Sunland Industries of California, a manufacturer of agricultural chemicals. Sunland extends Niagara's marketing sphere into the fertile San Joaquin Valley.

More Than One Way: FMC has also relied on joint ventures to establish itself in the chemical industry. The first in 1951 was the formation (with National Distillers) of Intermountain Chemical Co. to mine trona and produce soda ash. National Distillers at first had a 20% interest in the firm; it has since reduced this to 10%. FMC is entirely responsible for the operation; National Distillers' interest is purely financial. However, as a big consumer of bottles, its presence is undeniably an asset in selling soda ash to the glass industry.

In 1955, FMC bought the government's 90,000-ton/year butadiene plant in Houston, Tex. It then brought Ten-



Prutton filled in the organizational picture.





nessee Gas Transmission into a 50-50 venture, called Petro-Tex. FMC's interest is more than proprietary. For it is a partner in a business basic in petrochemicals. And it has never made any bones about its intention of using Petro-Tex products as stepping stones into petrochemicals.

Just about two years ago FMC teamed up with American Potash and National Distillers to form AFN, Inc. AFN's mission: development of high-energy boron fuels. American Potash, which actively supervises the project, now owns 50%; FMC and National Distillers each owns 25%.

Last year FMC joined National Distillers in a venture to promote its Dimazine unsymmetrical dimethyl hydrazine. And earlier this year, it sold a half interest in its carbon bisulfide and carbon tetrachloride production to Allied Chemical. This should be a happy arrangement for both parties. FMC's process for carbon tet starts with the bisulfide. And Allied is a big user of carbon tet for its Genetron propellents.

#### **Building Up The Base**

The sum total of the chemical business acquired by FMC came to about \$40 million/year. Thus, the biggest portion of its approximately \$150-million current sales volume has been internally generated—even after a hefty allowance for inflation.

Phosphorus and Trona: Westvaco is the best example of how this growth was managed. Before Westvaco became part of the family, it had two big projects but lacked money to carry them out: (1) make phosphorus from Idaho phosphate shale, (2) mine Wyoming trona and refine it to soda ash.

Actually, it had started to build an 8,000-tons/year elemental phosphorus furnace at Pocatello, Ida. But anticipating the boom in furnace phosphates for detergents, FMC laid out a bigger program. It started up the first furnace in '49, a second in '50, a third in '51 and a fourth in '53. Combined capacity of the four is now 120 million lbs./year.

Its ambitious phosphorus program probably set FMC back \$20 million. Moreover, the shakedown period was agonizing—Idaho rock differs considerably from that found in Florida or Tennessee. But all furnaces are now running smoothly and management is convinced that the investment was sound.

As it was expanding furnaces, FMC also enlarged burning capacity to convert elemental phosphorus to phosphoric acid. It now makes acid at Carteret, N.J., Newark, Calif., and Lawrence, Kan. Its Mineral Products Division uses a heavy share of the acid to make sodium tripolyphosphates; it is, in fact, one of the biggest producers of that product.

Although the phosphorus program already is a going business for FMC, it will take another couple of years before it is completed. Plans call for the project to make its own coke from coal normally unsuited for coking.

Westvaco also had grand-scale ideas about its trona deposits but lacked the necessary funds to execute them. It held the property on a renewable lease from the Union Pacific Railroad. It also held rights for additional exploration in the area. With FMC money (and the assist from National Distillers), it was able to go ahead with a mine and plant at Green River, Wyo.

Like the phosphorus venture, the trona project was an expensive, heartbreaking affair. The first soda ash produced was off-color, suitable only for tinted glass. But after four years, and a \$21-22-million investment, the firm started turning out quality material. And today, management feels quite satisfied about its trona investment.

Original plans called for the production of 300,000 tons/year. That has since been boosted and capacity now is at a rate of 470,000 tons. Work is continuing on methods of improving both mining methods and trona processing. Promising development: "solution mining." In this method, two wells are dug with a passage (fracture) between them. Water is pumped into one well, a saturated solution of trona flows out the other. This patented technique isn't yet perfected for trona. But FMC management can see another big soda ash-from-trona plant in their future. When it materializes, possibly it will employ solution-mining, as well as a new refining process.

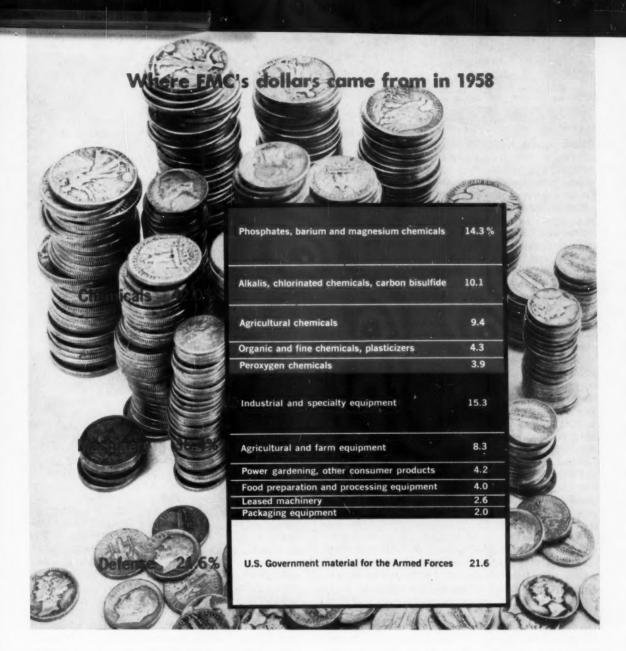
Cells and Salt: While FMC was pouring money into the phosphorus and trona projects, it was quickly learning that Westvaco's Charleston, W. Va., plant was sorely in need of modernization. Chlorine cells were outdated; high-cost salt was being used. Carbon bisulfide was made by shoveling sulfur and charcoal into a retort—a laborious, expensive method. Employee morale and productivity were low. The plant, in the words of one top official, was "a mess."

A five-year, \$15-million modernization program was started in 1953. The 5,000 small (mostly Vorce) cells were replaced with 442 Hooker Type S-3B cells. A bed of rock salt was discovered alongside Bens Run, a small creek in nearby Tyler County, W. Va. FMC immediately capitalized on experience gained in trona solution-mining experiments. Now the brine is barged to South Charleston. (The solution-mining technique has worked so well on salt that others have adopted it. According to FMC estimates, many million tons of salt are now mined that way annually.)

Putting the by-product cell hydrogen to work, the firm built a 75-tons/day ammonia plant. It built a 6-millionlbs./year plant to make cyanuric acid derivatives. And it completely overhauled the carbon bisulfide and carbon tetrachloride operations:

Westvaco had purchased rights to the Pure Oil process for making carbon bisulfide continuously from methane and sulfur. After an extensive development program, the ancient carbon bisulfide plant was ripped out and replaced with one employing the new continuous method. The plant was built to make 100 tons per day. Capacity has since been doubled.

The modern trend in carbon tetrachloride production involves the reaction of methane and chlorine. But four moles of hydrogen chloride are generated with each mole of carbon tetrachloride produced. Economies, therefore,



depend—to a large extent—on having an outlet for the hydrogen chloride.

The older method is chlorination of carbon bisulfide. Thanks to the economies inherent in its new carbon bisulfide process, FMC was able to use that route and sidestep the formation of hydrogen chloride. It worked up a new continuous process, replaced its old unit (also bisulfide-based) and raised capacity from 50 tons/day to 100 tons/day.

With Allied now participating in both bisulfide and tetrachloride production, the two plants are being expanded further.

Results of the face-lifting at South Charleston were the more impressive because improvement was needed so badly. A major reduction in total manpower was made. Chlorine capacity was raised from 360 tons/day to 442 tons/day. (By operating some of the old Vorce cells, the plant can turn out 500 tons/day.) Salt costs have been cut in half.

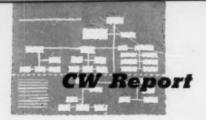
In view of labor's initial resistance to the whole idea,

and the execution of the project with a minimum interruption of production, the achievement was no small feat. Management freely gives credit for the operation to the young operating staff of the plant. Says Carl Prutton, executive vice-president of the Chemical Divisions: "There were so many obstacles that many seasoned plant managers just wouldn't have had the courage to undertake this task."

The final phase of the program—the streamlining of the 700,000 lbs./hour steam plant—won't be completed until 1962. This generates about half the electricity and all the process steam used in the plant.

Bucking a Trend: Becco operates two electrolytic hydrogen peroxide plants, its original one in Buffalo and a newer one in Vancouver, Wash. But its competition (Du Pont, Columbia-Southern, Allied and Shell) employ organic processes. Evidently, they must consider them to be more economical.

Becco has operated an organic process on a pilot scale since 1955 and has a strong patent position in the field. Instead of scrapping the electrolytic process, however,



management decided to continue to try to improve it. Results convinced them that game was worth the candle.

Capital investment, as well as major operating costs (e.g., steam), have all been substantially reduced. In fact, the feeling at FMC is that, for a small plant, the economics often favor the electrolytic route. An indication of this, the firm feels, is acceptance of the improved electrolytic process overseas. Becco has engineered — and is part owner of — a plant in Mexico City that furnishes all Mexican requirements. It has also licensed its process in Switzerland, Canada and Brazil. A number of other deals are now in the works.

While future developments, or perhaps the development of entirely new processes, can put the electrolytic method at a disadvantage, Becco engineers feel that their present plants can remain strongly competitive for the foreseeable future. Thus, they've sidestepped the need for a capital investment and gained time for additional development of their organic process, a program that has shown the way to some unexpected cost savings. They're convinced that when the time comes, they'll be able to build the best organic process plant.

Other accomplishments by Becco since becoming part of FMC: it recently brought in a new persulfate unit that boosted quality as well as output. It has developed a number of peroxygen chemicals and is working on others. Its early research in epoxy resins will soon be fully commercialized by FMC.

In other lines, too, FMC found it had to run fast to keep pace in the chemical industry. For instance, Westvaco had always had things pretty much its own way in barium oxide. It was turning out a 91% product. Several companies decided to enter the business with purer products. Westvaco had to revamp its process, boost quality to over 94%—at least as good as anyone else's.

A recent development from Fairfield has been the introduction of a colorless pyrethrin extract. Normally, refining of the crude extract from Africa gives a product with a brownish tint. The new material permits aerosol insecticides to be sprayed on household materials without danger of staining.

#### The Management Structure

Molding the chemical components of FMC into a cohesive unit is the result of an effort by the entire management team.

Paul Davies, chairman of the board, more than anyone else deserves credit for masterminding the firm's entry into the business. Moreover, he quickly adapted himself to the chemical climate. Here's what Jan Oostermeyer, former president of Shell Chemical and now an FMC director, says of him: "You have to remember that Davies is a banker by training. And bankers are, by nature, cautious; they don't like to gamble. Yet he picked up tremendous bills for the trona and phosphorus projects—without blinking an eye. And none of us could tell at the time just how valuable those projects were going to be." Davies also pitches in on many sales problems.

There's feeling among outsiders that Davies has a tendency toward autocratic rule. But evidences of this are hard to find among the Chemical Divisions—at least in important areas. Certainly, his chemical executives would not have been able to make the big strides they've taken in the past year and a half unless Davies had supplied the proper atmosphere.

FMC President Ernest Hart also made considerable contributions to the chemical business, particularly in the early days. Amiable, quiet in a sophisticated way, Hart has been the corporate balance wheel, the man who could keep Davies from getting discouraged and at the same time keep the enthusiastic chemical people from running too fast.

It was Hart who gave the Chemical Divisions some semblance of cohesion, when he was made executive vice-president in 1953. He sketched in the broad outline of a plan for the Chemical Divisions.

Carl Prutton, who took over in '56, started right in to finish the picture with broad, bold strokes. A long-time (1920-48) professor, Prutton left Case Institute to join Mathieson Chemical, where he eventually became vice-president and director of operations, engineering and research. He joined FMC in '54 as technical director of the Chemical Divisions, was made executive vice-president when Hart was named president.

Prutton brings an unusual combination of talents to the job. A renowned researcher and educator, he has also proved to be a top-flight administrator. Through both of his aspects shines a genuine fondness for handling people—particularly youngsters. His travel schedule is a constant source of awe to his colleagues. Most of it is spent visiting plants and laboratories, where it's not unusual to find him sitting up all night with a group of young chemists or engineers discussing their problems.

Niagara Overhaul: One of his first jobs on taking over the Chemical Divisions was to order a study of Niagara's organization. To appreciate that, you have to remember that Niagara was the company's original chemical enterprise. It had always been profitable, had an excellent growth record, and had furnished some key management men to the corporation. Niagara's Joseph Cary, before his retirement in 1954, became the executive vice-president of the corporation, then chairman of the corporation's executive committee. Hart himself came up through Niagara.

In short, Niagara was rather more than a favorite child, only slightly less than a sacred cow. Still, Prutton saw room for improvement. The division operated four different kinds of businesses, but lines of authority were not clearly drawn; everyone seemed concerned with everything.

Gil Clee of McKinsey & Co., management consultants, was called in. The "outsiders" made a comprehensive study, came up with a reorganization plan. Niagara management, after scrutinizing its own operations, arrived at a somewhat modified plan and then enthusiastically implemented the program.

The business was broken down into its four major activities:

(1) The largest portion (about 50%) is "formulated goods"—some 2,000 products sold through distributors, dealers and to large farms and ranches. This had encompassed 14 regions. Nine regions appeared more logical and nine men were selected for assignment as regional managers. Each manager was given a great deal of autonomy in setting prices, making other decisions.

To boost profits and reduce both inventories and accounts receivable, a strong incentive program was laid out for regional, district and territory managers.

Commission arrangements for the salesmen were also changed. Products were broken down into three categories, according to profit margins, and commissions were graded accordingly. So instead of pushing the "mine run" type of products, emphasis is placed on controlled or specialty products. Sales have not risen sharply as a result, but profits have.

A new accounting system had to be set up, since success of the plan depended upon quick flow of information to the proper people—regional managers, salesmen, etc.

Proof of the plan: profits as a percent of sales are now 30% higher than they were in 1957, when the system was put into effect, and return on investment has multiplied.

(2) The second important line is the manufacture of pesticidal products and their sale inside and outside the

corporation. Niagara had a DDT operation at Pine Bluff, Ark., but competition sharpened and the price dropped. A study showed that it was costing more than the selling price to make it. The DDT plant was liquidated and a long-term contract was negotiated for an outside source of supply.

But now there are other products, developed in Niagara's aggressive research program, filling the void left by the DDT plant. In the U.S., Canada and Mexico, Niagara now has 16 manufacturing plants. And this year it expects to introduce at least eight new pesticides. In fact, the manufacturing phases will probably develop into the most profitable segment of Niagara's activities.

(3) The third activity is the production of the "human comfort" products (pyrethrins and piperonyl butoxide) by Fairfield. These are shipped to Niagara's Middleport, N.Y., facilities, formulated with DDT or other products, and shipped out. This was set apart from the "formulated goods" line because sales are made in the form of concentrates to other manufacturers and to aerosol fillers.

(4) The fourth line has been small-package insecticides sold to the home gardener. This line is being discontinued in the U.S. because, in Prutton's words, "We don't know how to merchandise consumer goods. We'll leave the business to those who do."

Staff and Line: Some aspects of the present organization started to appear a long time ago. But the big move was taken in April, 1958 when the executive committee

### How FMC's Earnings and Dividends Compare

#### . with those of six "blue chip" chemical firms Earnings per Common Share % Gain Over '53 1957 1958 1959+ 1957 1958 1959+ 1953 American Cyanamid \$1.57 \$2.42 \$2.07 \$2.75 54% 32% 75% Dow\* 48 23 1.45 2.15 1.78 2.20 52 72 72 Du Pont 4.94 8.48 7.25 8.50 47 Hercules 2.12 2.90 54 47 110 1.38 2.03 Monsanto 9 1.54 1.68 1.55 2.40 1 56 Union Carbide 5.25 25 17 48 3.55 4.45 4.15 Average 3.55 4.00 65 28 69 2.41 3.14 FMC 1.83 2.30 2.38 2.90 26 30 58 with those of Dow-Jones 30 industrials Dividends 16.11 21,60 20.00 34 24 **Market Price** 273.27 467.52 510.17 601.71\*\* 71 87 119 FMC PER COMMON SHARE **Dividends** 1.00 1.00 1.05 1.20 20 Market Price†† 18.50 26.38 181 52

<sup>\*</sup>Fiscal year ends May 31 \*\*March 30, 1959, compares with 678.18 on July 29, 1959. \*Estimated. ††Average of prices on last day of each quarter.

was created and a familiar staff-and-line organizational chart was set up. The characteristic of this chart (see p. 37) is that the older, more experienced men are in staff positions while the line organization is in the hands of a group of youthful zealots.

The line is broken down into two departments, inorganic and organic. In the former are Chlor-Alkali, Mineral Products and Becco. The organic department is made up of Niagara and the Chemicals and Plastics divisions. Ohio-Apex is the nucleus of Chemicals and Plastics. Fairfield operations, under Chemicals and Plastics management, manufactures pyrethrin and piperonyl butoxide, and newer organic products needed by Niagara.

Up From Operations: Prutton's chief lieutenants in the staff are Bill Williams and Jack Vernon. Both came up through the divisions—Williams from Mineral Products, Vernon from Niagara.

Williams now is vice-president for manufacturing and engineering. His line responsibilities include the legal department, central engineering, process engineering and mineral development. Central engineering takes care of design and construction of major plants. Process engineering is made up of a small group—never more than five—of top-flight engineers. They trouble-shoot process problems, appraise the line organization, and handle projects (e.g., the new coking project) that would be too much of a financial drain on any one division.

The minerals development group is an important one for a company like FMC. Its function is twofold: (1) to assure supplies of minerals currently used in the company by exploring present properties, hunting for new reserves, and looking for ways to utilize different types of deposits; (2) to alert management to new mineral-based businesses the company might enter.

One of the strengths of the new setup is that men with broad industry experience in staff jobs can, without hampering the efficiency of the line organization, be freed to take on special projects. Thus, Williams was the one who negotiated the contract to build and test-operate the new \$13-million U.S. Army Chemical Corps plant in Indiana. He was also the man who dealt with Allied in establishing the joint venture in carbon bisulfide and carbon tetrachloride.

Vernon had been president of Niagara before he took over his present duties as vice-president of marketing and distribution. Reporting directly to him are the controller and department heads for traffic, advertising and publicity, purchasing and industrial relations. Because of his wide acquaintance with suppliers and customers (he's president of the National Agricultural Chemicals Assn.), he's also charged with the increasingly important trade relations function.

Vernon has devoted considerable effort to reducing stores inventories. Several contracts have been signed with local contractors who stock items for the firm. "That way," says Vernon, "we pay slightly more for the material, but we release capital. And if we can unloose a couple of million dollars, we have the cost of a new plant."

Bernard Jacobson, also an FMC vice-president and member of the executive committee, was president and owner of Ohio-Apex before FMC took it over. In fact, in a very real sense, he was Ohio-Apex. He now works only part-time; his contributions are as a consultant on both technical and business matters. But his counsels are sought after and listened to. His own summation of his function now: "When things aren't going as well as they should, I supply the needle."

The Balance in Research: Emil Ott, who for 16 years was director of research for Hercules Powder, came to FMC in 1955 as a Chemical Divisions' vice-president and director of central research. One of his first steps was to set up a research committee, of which he is chairman. At that time, the operating arms were free to conduct research in any area they saw fit. There was considerable wasted motion and duplication of effort. The research committee instituted a project proposal system.

A proposal is normally written for a year. Into it go all pertinent data. Whether it's a new product or process, the goal is to determine how it would fit into the corporation from the standpoint of sales, production and raw materials; how much it would cost and over how long a period. "When that's filled out," says Ott, "much of the need for 'coordination' disappears."

A central research center, completed in Princeton two years ago, is now being enlarged. In addition to directing that, Ott also directs activities of a special projects laboratory in Buffalo, which carries out government work.

Management could see both advantages and disadvantages to completely centralized reseach. So it hit upon what it feels is a happy medium: long-term research is centralized; work that's clearly of benefit to a single division is carried out by that division. Budget for chemical research now runs about \$6.5 million; about \$2 million worth is centralized and the rest is carried out by the divisions.

Holding the Line: Holding down the key positions in the line organization are Fred Gilbert, who heads up the Inorganic Dept., and Al Loeffler, his counterpart in the Organic Dept.

Gilbert came to FMC with Becco. He became head of Becco and the Chlor-Alkali Division in '57. In his new post, he has full responsibility for the profit and loss of his department.

Concerning the new organization, he says, "What we're trying to do is to make the divisions reshape their thinking so they'll feel more like parts of a bigger corporation. At the same time, we have to give them enough autonomy to do the job expected of them. We have to rebuild the loyalties of our research people, too, while maintaining their divisional spirit." The job, he freely admits, takes time. By the same token, he feels that significant progress has been made.

Loeffler joined FMC in 1953; he had been director of development for Monsanto's Organic Chemicals Division. His functions for the Organic Dept. are identical to Gilbert's for inorganics.

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agent, extender, binder and flow promoter in pigment application—inks, paints, ceramics • a dye solubilizer and complexing agent in ball point pen inks and textile specialties. **PVP K-90** (high molecular weight) • specific dispersant for TiO<sub>2</sub> and latex polymers used in emulsion paints • levelling agent in styrene-acrylic emulsion polishes • as cohesive agent or binder in glass fiber and specialty paper manufacture.

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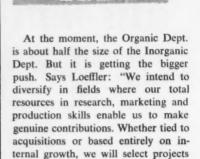
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CW Report

Gilbert and Loeffler are poles apart in temperament. Gilbert has an easy, infectious vitality. Loeffler is more reserved, exudes an air of quiet competence. Both are highly regarded in the organization.

that realize a high return on invest-

ment."

Moreover, both oversee a group of young, competent divisional managers, who are in turn backed up with able staffs. This pipeline full of young managerial talent may well be FMC's greatest asset in the chemical business.

Room To Grow In: There are some gray areas on the organization chart. It's hard to draw a line showing where the plant's engineering group leaves off, say, and Williams' process engineering staff takes over. But, so far at least, no trouble spots have developed.

What's more, the organization is designed to be fluid. New products, for instance, may sometimes be taken away from one division and placed with another where they would be more at home. "There's always some disturbance," says Prutton, "when you take the child away from its mother. But in the few, exceptional cases where it has been done, the moves have been accepted as a sound, reasonable policy."

Although management doesn't rule out further acquisitions under the proper conditions, it seems clear that it is pinning its hopes for growth on its present foundation.

And management can see plenty of room to grow in. Certainly, it plans to shore up the organics end. Polymers are definitely getting attention. Niagara, firmly entrenched and growing rapidly in insecticides, has picked up considerable know-how in biochemistry. A good bet for the next step: veterinary chemicals.

The growth potential in propellents

SALES REPRESENTATIVES IN: Atlanta, Ga. — Buffalo, N. Y. — Chicago, III. — Detroit, Mich. — Houston, Tex.

is not being overlooked. FMC makes hydrogen peroxide and unsymmetrical dimethylhydrazine. Through its participation in AFN, it has a foothold in boron chemicals. In addition, it's covered in solid propellents: last year Petro-Tex acquired 93% of the stock of Grand Central Rocket.

Balancing Up: With the aid of hindsight, which is almost infallible, it's easy to single out mistakes FMC has made. It stubbed its toe on the Farrington Daniels nitric acid process, which resulted in a "largely technical success but an economic failure." Reportedly, it spent considerable money in building and operating a pilot plant; and tied up considerable technical talent building and operating a bigger unit for the government before the project was shelved.

Also, there are still some anomalies in the company. It has laid out a highly progressive program for dealing with its several publics. But it is among the most tight-lipped of chemical companies where many of its projects are concerned. Management takes pride in its policy of delegating authority. But there are still signs that this has not thoroughly penetrated the lower echelons.

Some hold that the company could have moved a lot faster in bringing its chemical operations together, that the decision to modernize the South Charleston operation was unnecessarily delayed.

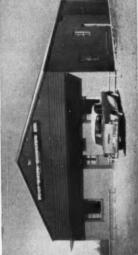
But even 20-20 hindsight can't flatly prove that the corporation could have done better-or even as well-in the long run if it had scheduled things differently. And, on balance, its record of achievement heavily outweighs its shortcomings.

In the difficult, competitive chemical field, FMC has built an alert, aggressive business. Prutton sums up its accomplishment this way: "Most people only achieve about one-third of their real potential, due mainly to lack of opportunity, training and motivation. We are trying to at least double this figure and believe we are doing it."

He might get an argument on the percentages. It's hard to quarrel with his results.

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These three Rigid Frame structures, illustrated in Stran-Satin Blue, combine office quarters with column-free shop or warehouse space. Note variety of door and window openings. Every Stran-Steel building is site-styled and planned for maximum esticiency of the specific operation.

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The world's only large tonnage liquid hydrogen facility—near West Palm Beach, Florida—has been put on-stream by Air Products, Inc. of Allentown, Pennsylvania. The Lummus-designed, engineered and constructed hydrogen production section of the plant has been producing at over-design rate and at 99+% purity (better than design) since the test run was successfully completed 21 days after the initial operation of the

gas generators.

The hydrogen production section combines Florida crude oil, oxygen and water to generate hydrogen gas.

Liquid hydrogen product from the new facility assumes an increasingly vital role in the nation's defense system. New capability in handling, storing and firing liquid hydrogen in rocket engines substantially improves our nation's position in the race for missile and space superiority.

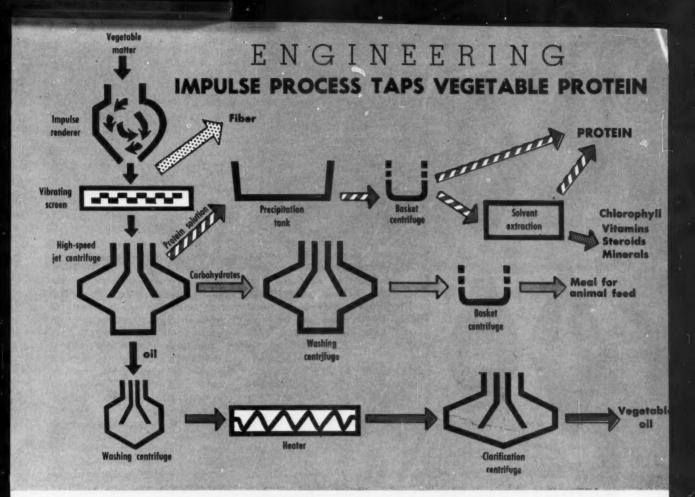
Lummus has completed a number of gas generation units in recent years, and also has extensive experience in design, engineering and construction of plants for ammonia synthesis.

In the past 50 years, Lummus has built over 800 plants to produce petrochemicals, chemicals and petroleum products. If your company is planning facilities of this kind, discuss your plans with Lummus.



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### Rendering Route Pulls Food from Grass

In London this week, British Glues & Chemicals, Ltd. is busily piloting a new process of extracting and separating edible protein and a variety of salable by-products from grass and oilseed residues. The company has already put the new technique up for licensing, is currently negotiating with several foreign firms.

Primary goal of the British Glues process: to provide a cheap, efficient method for converting abundant—but inedible—vegetable materials into a food additive that can be used to supplement protein-deficient diets. The by-product recovery of such salable extractives as vegetable oils, chlorophyll, steroid intermediates and vegetable fiber will help substantially, the company feels, to minimize the cost of the protein.

Based on the current pilot-plant operation, it's estimated that the process will yield protein at a cost of about 21¢/lb.—or less than 2¢ for the average human requirement of 2 oz./day. Both the size and capital

cost of a plant depend on the population to be served, cost is expected to be about \$2.80 (£1) per capita. British Glues' "commercial scale" pilot plant cost about \$84,000 (£30,000), has a capacity of 1 ton/hour of vegetable feedstock. Protein production varies widely with the feed—e.g., peanuts yield some 450 lbs./ton; grass, about 50 lbs./ton.

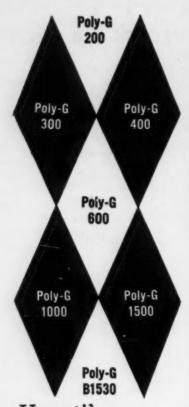
Breaking the Barrier: Though nutritionists have long been aware of the protein potential of inedible vegetable materials, the problem of extracting it from the cells of leafy plants barred simple, straightforward recovery. British Glues solved this problem with the Chayen impulse process—a cell-breaking technique originally developed by the company's assistant managing director, Israel Chayen, for the rendering of animal bones and fat (CW, Nov. 8, '52, p. 60).

In impulse rendering, cellular material suspended in a liquid is subjected to a series of shock waves of sufficient intensity and frequency to rupture the cells. The shocks are generated by specially designed beaters and, in the case of protein recovery, the liquid medium is slightly alkaline water which dissolves the freed protein and some of the vegetable oils.

Once the problem of breaking the cells had been solved, British Glues concentrated on the separation and purification of protein and other extracted products. Here's the separation process that evolved from more than five years of research and development:

Extractive Angle: The impulserendered vegetable materials are carried out of the mechanical beater in the stream of alkaline solution and fed to a vibrating screen "filter". Screened-out fibers can be recovered for papermaking.

Second step in the separation is centrifugation to take off vegetable oils which are subsequently refined also by centrifugal washing and clarification. In the case of grass or other



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#### ENGINEERING

products low in oil content, oil recovery may not be worthwhile. The insoluble carbohydrates removed here from the protein solution can be processed into meal for animal feed.

From the centrifuge, protein solution is pumped to precipitation tanks and there neutralized to drop out the dissolved protein and oil as a slurry. This product may be further treated with solvents to recover chlorophyll, steroids and other constituents before the protein is finally dried.

The protein product is a fine powder which has no odor and very little taste. The latter characteristics are important in parts of the world where the population may be reluctant to depart from traditional foods. Vegetable protein, like fish flour (CW. May 16, p. 88), is intended primarily as an additive to flour. And though the product may not be as palatable as the meat and milk obtained from cattle, British Glues estimates the yield of impulse-processed protein from a given acreage of vegetation may be ten times greater than that produced by grazing animals.

#### **Water Project Progress**

Industrial and government sponsored sea-water conversion programs moved closer to their goals last week. The Dept. of the Interior pushed government projects into the design stage by awarding architect-engineering contracts for its three authorized water-desalting demonstration plants (CW Technology Newsletter, July 25); Cleaver-Brooks Special Products Co. (Waukesha, Wis.) shipped key components of the plant it's readying for test operations in November at Southern California Edison's Mandalay Steam Station (near Oxnard, Calif.).

Designs for all three of the government water conversion plants are expected to be ready early next year. The firms receiving contracts, as expected, were those who did the preliminary work on each of the processes:

• W. L. Badger & Associates (Ann Arbor, Mich.) received a \$62,000 contract for the long-tube vertical distillation plant to be built adjacent to Dow Chemical's Freeport, Tex., plant. Capacity: 1 million gal./day.

 Fluor Corp. (Los Angeles) was awarded a \$102,000 contract for the multistage flash distillation unit scheduled for construction on the California coast (CW Technology Newsletter, Aug. 22). Capacity: 1 million gal./day.

• The Bureau of Reclamation (Denver) will design the electrodialysis plant for brackish water conversion at a site either in the Great Plains or in the Southwest. Contract price has not been set, but plant capacity is now pegged at 250,000 gals./day.

King-Size Evaporator: Outstanding component of the Cleaver-Brooks 100,000-gal./day unit is the 70-ft.-long evaporator—said to be the world's largest. Its 26 stages of flash evaporation also sets a record for the number of stages employed in a single plant.

Initial operation of the plant is scheduled to include an extensive test program to be conducted jointly by Southern California Edison and Cleaver-Brooks engineers. Purpose: to determine operating variables and establish the economics of a multimillion-gal./day installation. The plant will operate off residual heat from the power company's steam station, is sufficiently flexible to permit cost studies under a wide variety of operating conditions. The project is being sponsored entirely by private industry. Cost: about \$250,000.

#### **Big Unsaturated Rings**

A new intermediate for plastics production is now being made on a commercial scale by Chemische Werke Huels at Marl, Germany. Process for making the compound, cyclododecatriene-1,5,9, was licensed from the Max Planck Institute (CW, Sept. 5, p. 42).

The new substance can be oxidized easily to succinic acid or, after hydrogenation, to dodecane-1,12-dicarboxylic acid, both of which are used as raw materials for plastics.

Cyclododecatriene is produced by adding butadiene to a suspension of diethyl aluminum chloride (five parts by volume) and titanium tetrachloride (one part) in benzene at 40 C. After 5-6 hours, the catalyst is hydrolyzed with water and the products are isolated by steam distillation. Commercial yield of the main product is 70-80%, based on the total butadiene input. By-products that can be isolated are cyclo-octadiene-1,5 and cyclohexadecatetraene-1,5,9,13.



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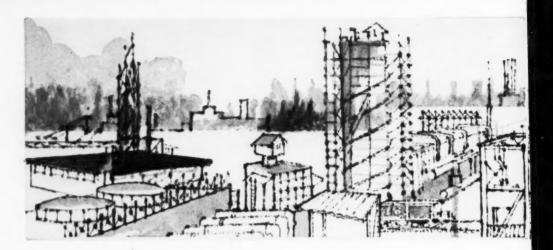
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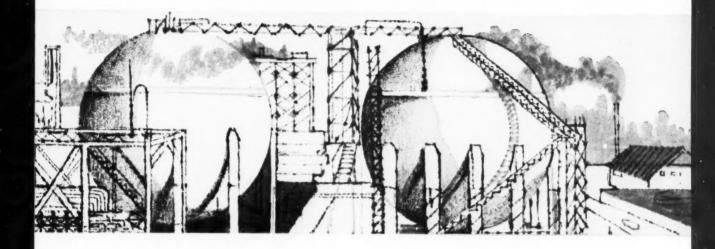
When you go to an engineering firm for help in the design and construction of a new plant, or the expansion of existing facilities, you have a right to expect certain basic standards from that firm. They should have EXPERIENCE, for only with past experience can you minimize the number of new problems which will arise on any new project. Such experience, however, should be tempered with FLEXIBILITY, CREATIVITY and VISION. Some companies are experienced beyond measure at building plants from designs more than 25 years old. In the highly competitive years ahead, such plants could prove economically unsound. You owe it to your company's future to select a firm which has proven its ability to provide the newest and the best in process engineering.

For almost half a century, CHEMICO has maintained a reputation for progressive and imaginative process design and improvement. This proven "know-how" is available to firms in the chemical and petrochemical fields requiring any and all types of engineering and construction services.

#### WAYS OF WORKING WITH THE CLIENT

A recently completed petrochemical plant offers the best example of the several ways in which Chemico is prepared to work with its clients. This huge complex was designed to produce acetylene derivatives, and included processes for producing a wide range of basic chemicals. The ammonia, sulfuric acid and ammonium sulfate sections of this plant were based on Chemico's own proprietary processes. The designs for the acrylonitrile and hydrogen cyanide units were based on processes developed in the client's own pilot plant. For the acetylene plant, Chemico obtained a license from BASF in Germany for their patented production-proven process. The oxygen plant was designed by the Linde Company of Germany on a sub-contract basis. Chemico's Construction Department was responsible for erection of all the plants, and Chemico's Industrial Projects Department supervised, coordinated and controlled the entire project.

CHEMICO is always prepared to provide its services to clients on any or all of the bases indicated above. For clients with processes of their own, Chemico's Industrial Projects Department will engineer and construct plants, starting at any stage of development. CHEMICO's own laboratories and pilot plant are available, if desired, for process development and improvement work on a contract research basis. If the process to be employed has already undergone pilot stage testing, CHEMICO will design the most economic and efficient commercial scale operation. In such a case, the client can be sure that CHEMICO will call on the services of outstanding engineers and technical personnel with experience similar, or related to the unit operations which are to be designed, engineered and constructed. In addition, the client can be assured that CHEMICO, as an independent engineering organization, will undertake such activities in the framework of a completely confidential relationship,



with all necessary safeguards for protecting the client's competitive position in regard to trade secrets and research developments.

In the case of clients who want plants to produce products for which neither Chemico nor the client has a process, Chemico, through its Industrial Projects Department, will obtain licenses from whatever source possible for production-proven process designs which will enable the engineering and construction of the desired plant.

Very often Chemico's drafting force as well as its specialists in civil engineering, mechanical engineering, electrical engineering and other service engineering capacities can be made available to clients on an individual contract basis. Chemico's construction organization, made up of a permanent force of highly experienced construction superintendents, is prepared to undertake a wide range of erection projects related to the process industries.

#### CONTRACT ARRANGEMENTS

Chemico offers its clients a wide choice in the type of contract under which each individual project is to be handled. Among the more common arrangements—although by no means the only ones available—are the following:

Cost Plus Fixed Fee: Under this type of contract, Chemico's fee and overhead charge for engineering, construction and related services is decided by mutual agreement, and the client is billed at direct cost for any and all expenses incurred by Chemico to complete the client's project.

Lump Sum: At the client's request, Chemico submits a firm estimate containing a specific price for which Chemico will undertake to complete the client's project.

Guaranteed Maximum: Under this type of contract, Chemico will set a maximum cost to the client for an individual project. If the cost of the project falls below the maximum figure, all savings will be divided between Chemico and the client on the basis of a prearranged rate.

Fixed Price Equipment Supply: Under this type of contract, the client gets the benefit of Chemico's design, engineering, purchasing and expediting services, but is free to make his own arrangements for the construction of his project.

Basic Design and Construction Supervision: This type of arrangement has proved extremely useful in dealing with clients outside the United States. Ordinarily, under a contract of this sort, Chemico provides the basic engineering for a project, and the client makes other arrangements for the detailed drawings and construction. Chemico then supervises construction and sees the project through start-up operations.



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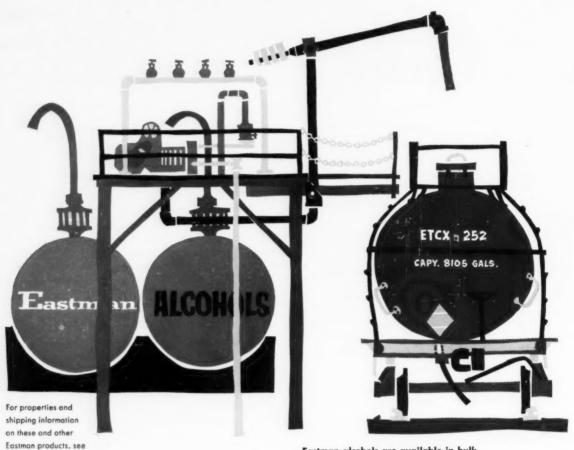
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Chemical Materials
Catalog, page 357 or

Chemical Week

Buyers Guide, page 97.

#### ENGINEERING

#### PROCESSES

High-Purity Tungsten: A new method of producing high-purity tungsten from a mixture of gases and simultaneously forming it into simple shapes has been developed by the Bureau of Mines. Small quantities of the refractory metal (melting point, 6170 F) produced at the Bureau's Rolla, Mo., laboratories reportedly have exceeded 99.99% purity. Though details of the process haven't been revealed, Director Marling Ankeny termed it a "giant step forward" in high-purity metals research. With the new technique, he added, it should be feasible to "plate" high-purity tungsten on various surfaces, thereby greatly extending its usefulness.

New Sugar Cleanup: A group of Hungarian engineers have developed a new cleanup technique said to solve several beet sugar processing problems. Key: use of liquid cyclones in place of filtering equipment for removing suspended impurities from raw sugar juice. The cyclones not only reduce equipment and labor requirements, say the Hungarians, they also simplify waste disposal—the dilute portion can be discharged directly into streams, and thick residues handled in settling ponds only one-seventh the size of those required for unseparated wastes.

Silk-Screen Circuits: Printed wiring can be applied directly on ceramics by a silk-screen printing method developed at Bell Telephone Laboratories. By eliminating adhesives conventionally used to bond copper foil to ceramic or plastic bases, the silkscreen process avoids a common cause of failures during soldering and assembly. Circuits are printed with a paste of finely ground copper oxide and glass frit blended with a standard silk-screen printing vehicle. When dry, the printed pattern is first fired at 750 C for 20 minutes to burn off the vehicle, then fired for 30 minutes in a reducing atmosphere at 850 C to reduce the copper oxide to metal. Controlled amounts of oxygen (0.4-4.5%) are added to the reducing gas (95% nitrogen, 15% hydrogen) to prevent reduction of other oxides and to promote good wetting of the ceramic base by the glass frit bonding agent.

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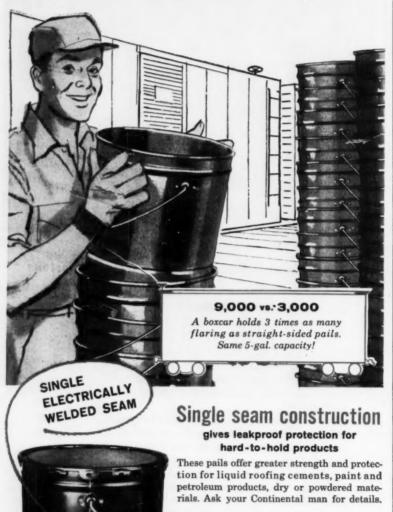
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#### ENGINEERING

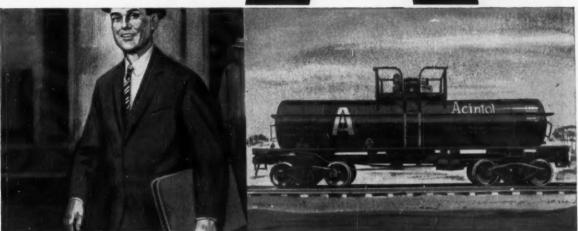
New Refractories: Two new types of refractory-forsterite and stabilized dolomite-have been developed at the Indian Metallurgical Institute of Jamshedpur (Bihar). The forsterite (magnesium silicate) is produced by mixing magnesite (magnesium carbonate) with cheaper ores, such as serpentine, saxonite and dunite, and firing at 1600 C. The grog (crushed refractory) obtained from the firing is then pressed into bricks and refired at 1500 C. Forsterite brick is said to withstand higher temperatures under load than magnesite brick (up to 1600 C vs. 1500 C) and to possess good resistance to thermal spalling. The new dolomite refractories are made by a similar two-step firing process from a mixture of dolomite (calcium magnesium carbonate) combined with the stabilizers, e.g., serpentine, used with the new forsterite brick.

Heavy-Water Bypass: Heavy-water production at AEC's Savannah River plant is now carried out in two steps instead of the original three, according to a report presented at this week's meeting of the American Institute of Chemical Engineers in St. Paul (Minn.). The principal method for concentrating the deuterium content of natural water (CW, Oct. 5, '57, p. 31) involves dual-temperature exchange with hydrogen sulfide (CW, Aug. 1, p. 45) to boost it from 0.015% to about 15%: followed by distillation to 90% concentration; and, finally, electrolysis which yields fully concentrated (99.8%) heavy water. However, William Bebbington and Victor Thayer of Du Pont (operator of the Savannah plant) told AIChE conferees that the electrolytic concentration has been completely shut down and that moderator-quality heavy water is being produced directly from the distillation step. AEC's estimate of future heavywater requirements shows a downward trend-from \$4.3-million in sales in '59 to about \$1.8-million for fiscal '60.

**Pigment Patent:** Switzer Brothers, Inc. (Cleveland) has received a Canadian patent (No. 577,744) on its process of making thermoplastic melamine-sulphonamide-aldehyde pigments (CW, Feb. 1, '58, p. 82). These pigments are widely used to impart daylight fluorescence to paints, inks, plastics and synthetic coatings.



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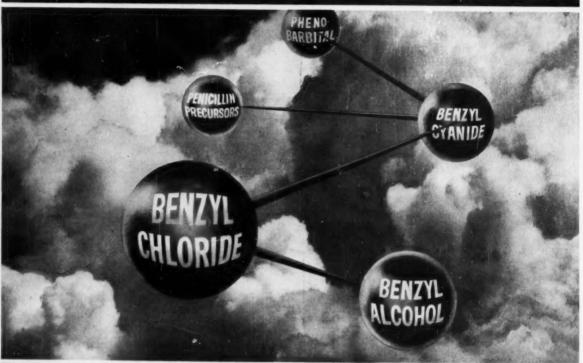
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See Chemical Materials Catalogue listing on page 122

# PRODUCTION

## Realty Giant Tackles Equipment Leasing

This week at its showplace office building at 666 Fifth Avenue in New York City, Tishman Realty & Construction Co. is settling its new subsidiary, Tishman Equipment Leasing, Inc., into 35th-floor offices. The new company, formed just over a month ago, is already in operation. One of its aims, according to Vice-President William Burt (below): leasing equipment to chemical and petroleum companies.

This isn't the first time that leasing companies have made a play for chemical industry business. A number of them leased more than \$18 million in equipment to drug and chemical manufacturers last year (CW Technology Newsletter, Jan. 10), and one firm, Nationwide Leasing Co., made a special pitch to chemical equipment sales engineers earlier this year (CW, July 11, p. 53). But Tishman is by far the largest firm to have entered the field.

"We're backed by the assets of Tishman Realty & Construction, which alone has \$12 million on the books. And we're the only one in the leasing business with a name up on "The Big Board' in Wall Street," says Burt.

How much influence either these facts or the firm's name will have

**6We** can show a firm . . . items it never thought of leasing.

on the chemical industry remains to be seen. Until now, chemical companies have shown only mild interest in equipment leasing—the \$18 million worth they leased in '58 was only 6% of industry's total \$300-million leasing bill.

More Than a Name: Burt is certain, however, that more than the Tishman name will be working for TEL. Involved is the money picture, which is changing rapidly. In the past, chemical companies haven't done much leasing. They've had a higher return on investment than most other industries, have had money readily available to put into working capital, Burt says.

But now money is getting tighter. And leasing companies have the advantage because, while most bank loans are based on a firm's debit-toworking-capital ratio, leasing can be based on the firm's willingness to exchange future earnings for working capital. A leased plant or piece of equipment will provide those earnings, Burt says.

Further, the 10-11% simple interest rate that may be the total charge of leasing is considered inexpensive money by Burt. He figures that it costs a company close to 15% to raise capital on its own, withhold

6A company can have an answer about leasing within 72 hours.9

earnings or float additional equity.

"I think the rates will be lower than any underwritten by a bank. And there is no worry about lawyer and broker fees, no long, time-consuming meetings with underwriters. A company can have what is essentially debenture money within 72 hours," he says.

Essentially Equipment: Tishman, with its realty background, can, if necessary, buy land, build and equip a plant to specifications, then lease the entire package. But Burt points out that TEL only wants to do this if the ratio of equipment to land and buildings is large. "We are basically an equipment leasing company," he stresses.

Becoming involved in land purchases slows up a transaction. And for a large plant, the more probable method would be for a company to obtain a 20-year loan on both land and building from banks or insurance firms and then obtain a five-year lease on the equipment. A lease for such a period is preferred because that is the normal bank-lending period, says Burt.

Almost any kind of equipment can be leased. "We can go to an interested company and show it \$500,000 in items it never thought of leasing,"

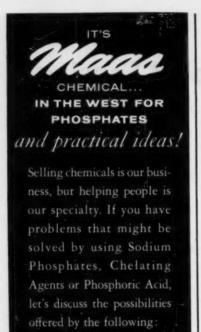
6We want to make the little fellow happy—ease money. 9

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#### PRODUCTION

Burt comments. As an example, he points to an expensive catalyst that one petroleum refinery is currently leasing.

Rates, of course, depend on how conventional the equipment is. And, Burt suggests that at times it is advisable to lease office equipment, which has a faster depreciation rate, rather than plant equipment.

Leasing by Small Firms: "Lease rates are higher for small companies—but not much higher. We don't want to make the little fellow unhappy, because leasing can be relatively more advantageous to him than to a bigger company," says Burt.

"Leasing gives the small company complete flexibility. It makes it easier for the small concern to obtain money. It makes it possible for a company to liquidate leased equipment that is obsolete, obtain a new lease on modern equipment in an arrangement that is less costly than if the company had purchased the equipment. After all, we aren't anxious to have the lessee in a poor competitive position," he says.

But leasing is no easy way out of an untenable situation. "A company still must sell us on its plans to buy new equipment. And, buying or leasing, a bad guess is a bad guess the company loses its money either way," says Burt.

It is, he notes, too soon to say just how much chemical industry activity in equipment leasing will pick up with TEL's entry into the field. But the Tishman name and resources are certain to cause some companies to study more closely the potentials of leasing.

#### Wax Process Winner

The centrifuge has been gaining ground as a process tool in the last few years, thanks to many new types of units and engineering techniques (CW, July 26, p. 34). Recent case in point: a new Titan Corp. centrifuge sold by Pfaudler Division of Pfaudler Permutit, Inc. (Rochester, N. Y.), to S. C. Johnson & Son, Inc., for refining carnauba wax.

The centrifuge replaces plate-andframe filter presses, increases the yield of clarified carnauba (material value: 80¢/lb.) from 90 to 97%. This operation enables Johnson to upgrade crude carnauba for all of its requirements and to discontinue purchase of refined carnauba for some products.

Keys: a steam-heated bowl on the centrifuge that can be opened for 0.1 second for discharge of accumulated solids, and controls that permit automatic scheduling of bowl flushing, recycling and regulation of effluent density and sludge concentrations.

The bowl of the centrifuge is preheated to 235-240 F, maintained at that temperature throughout processing to prevent the carnauba wax, which has a 180 F melting point, from solidifying. The feed, containing about 97% carnauba, 1% water and 2% sediment (chiefly natural, fibrous materials), enters the centrifuge through the top, travels down through a center tube and then up through vertical holes in a series of discs.

The solids slide outward along the undersides of the discs, agglomerate to speed settling, slide into the bowl. On a preset time cycle, the bowl is opened for 0.1 second and solids are discharged. The wax effluent contains 99.7% carnauba and 0.3% sediment.

Initial recovery of the wax is 96%, compared with 83% from filter presses. A reslurrying and recentrifuging operation adds another 1% to the yield. In the old filter-press method, reslurrying and refiltration increased the yield from 83% to only 90%.

#### EQUIPMENT

Insulating Firebrick: The Refractories Division of The Babcock & Wilcox Co. (161 E. 42nd St., New York) says its newly improved insulating firebrick has the lightest weight and lowest thermal conductivity of any firebrick now available. The K-20 brick's mechanical strength has been increased 65%, the K-23 brick 50%; K-20's average weight is 1.70 lbs., K-23's is 1.85 lbs., per 9-in. straight brick. The K-23 brick is for 2300 F

High-Temperature Lubricant: Almasol #1250, a new product of Lubrication Engineers, Inc. (2809 Race Ave., Fort Worth, Tex.) is claimed to withstand temperatures up to 1900 F and remain chemically stable inside drying ovens and kilns. The lubricant is said to be unaffected by acids, provides a permanent shield on metal surfaces.



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### SALES AND DISTRIBUTION

## **How Much for Product Liability Protection?**

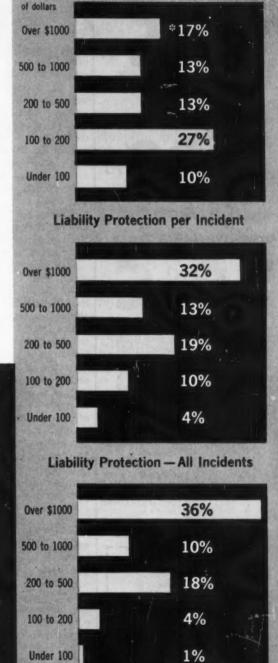
Product liability claims against CPI companies are holding steady in number and dollar volume. Nonetheless, chemical firms have yet to find a simple formula to determine how much product liability insurance is enough. That's the essence of a new survey made public last week by the Drug, Chemical and Allied Trades Assn. (DCATA) of the New York Board of Trade.

DCATA obtained replies from 180 member firms on product liability claim experiences, and the nature and amounts of product liability insurance carried. Other points covered: use of warning labels on packages, difficulty of buying new insurance.

Over half the companies queried reported that product liability claims were filed against them within the past five years.\* Of those companies that have faced such claims, more than half estimated the number of claims was not unusually high or low. And 49% told DCATA that total sums claimed are relatively unchanged over the last five years. But about 25% felt both number of cases and claim settlement size were increasing. Reason: greatly increased awards of recent verdicts, harsher judicial interpretations of what constitutes liability and wider distribution of products.

These reports of rising liability claims are apparently

**How CPI Firms Figure Their Needs** 



Liability Protection per Person



\*Numbers indicate percentages of surveyed companies with product liability insurance and the amount

SOURCE: Drug, Chemical and Allied Trades Section; New York Board of Trade.

<sup>\*</sup>There was sharp difference between New York-based firms and other member companies in the number reporting product liability claims. While 75% of the New York firms reported such claims, only 43% of other member companies did.



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more pronounced among drug and pharmaceutical companies. Case in point: some 30% of the respondents in these areas noted an increase in liability claims from allergies. These firms believe that wider publicity, product distribution and more potent formulations are causing the upswing.

Insuring Against Losses: The vast majority of firms polled (89%) carry product liability insurance; nowadays, self-insurance plays only a minor role; less than 6% of companies use it. More often (58%) than not, insurance coverage is worldwide. And policies carried by three-quarters of the companies apply to property damage as well as personal injury. In nearly all (96%) companies with such insurance, the coverage applies to the whole product line, is not allocated to specific products.

Since liability claims and suits can come from various sources (consumers, distributors, processors), many CPI companies (53% of those carrying insurance) protect themselves from countersuits by including a vendee's endorsement in the insurance policy.

Such an endorsement protects the manufacturer by covering the liability claims against his customers. More than two-thirds of companies employing vendee endorsements use the 'broad form" type. This means that the manufacturer's insurance protection covers his customers from liability claims arising in connection with his products-even if further processing changes them. A much smaller segment (26%) use the "limited form" of endorsement. This narrows the manufacturer's liability by imposing dollar or product limits on any liability claims, or by relieving the manufacturer of responsibility if intermediate processing has contributed to the cause of the claim.

Premiums for this additional protection are generally based on gross sales volume to the intermediate processor or distributor. They are paid by the manufacturer since he benefits from the protection.

How much insurance is enough? DCATA's survey shows wide variations in company practice (see chart p. 63). Nearly three-quarters of those firms carrying product liability insurance have at least \$100,000 worth of coverage per person. Insurance on a per-incident basis is considerably higher. Nearly half (45%) of the firms

carry \$500,000 or more worth of insurance.

Protection Boost? Most (83%) of the firms term their current product liability insurance "adequate." But some are looking to increase their protection in this vital area, and, as nearly three-quarters of those now carrying insurance report, it's no harder for them to buy added coverage now than it was five years ago.

Some 61% of the firms carrying product liability insurance take no chances when they receive a complaint, bring in the insurance company immediately. But 14% prefer to wait for a formal complaint. A few even hold off until a lawsuit is launched.

Company cooperation with the insurance firm varies considerably. Nearly a third of the companies carrying insurance reported that they do little or nothing in helping the insurance company with correspondence, trial preparations and other settlement negotiations. Only a small segment (under 10%) cooperate totally.

How does a company pin down the amount of product liability protection it needs? No single formula appears to be widely used. Some 39% of the companies carrying insurance base the amount on sales volume—gross or net. Almost as many (34%) admit they arrive at amount of protection needed by guess or estimate.

Past Settlements: Out-of-court settlements have apparently satisfied chemical companies more than jury awards. Over half (52%) of the respondents report that claim settlements have been "satisfactory." In contrast, only 38% of the companies reported satisfaction with the outcome of litigation.

Adequate warnings on packages constitute an important element in preventing losses from product liability claims. Of the firms polled, 72% stated that they use some form of warning labels. About two-thirds of the companies use specific warnings, while only 14% take the precaution of combining both specific and general warnings on their labels.

Product liability insurance, as the survey shows, is a complex subject. And that's why DCATA has cautioned members that the findings may not be indicative of the status of product liability problems within all segments of the CPI. Nevertheless, the study is sure to set guideposts for future work.

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### Selling Salesmen on Sharper Pitching

SAACI MEMBERS LEARN FINE POINTS OF COMMUNICATIONS



Nirenberg: "Getting through means overcoming basic human tendencies."



Magoffin: "Home-office feedback of information is vital to salesmen."



Finkel: "Reports offer the best means of solving sales' unique problems."

To make a successful pitch to a customer or your boss, you've got to overcome six basic human tendencies that work against a meeting of the minds. This piece of sound, moneymaking advice was punched home last Monday to approximately 300 salesmen and sales managers attending the Eighth Chemical Sales Clinic of the Salesmen's Assn. of the American Chemical Industry, Inc. (SAACI) in New York's Roosevelt Hotel. Giving the advice: Jesse Nirenberg (left), director of psychological services, TradeWays, Inc.

Nirenberg listed those human tendencies as: resistance to change, distraction by personal concern, talking before thinking, wishful hearing, jumping to conclusions and habitual secretiveness.

"People don't want to exchange the ideas they hold for others, particularly if their own ideas are based on long-held attitudes. As a salesman, you're competing with your listener's inner thoughts and feelings, which tend to draw him away from what you're saying," Nirenberg said.

He warned salesmen to be on the lookout for contacts who start talking before they think. "Those people talk before their ideas are clearly formed and as a result they keep changing direction. They're almost as difficult to deal with as people who hear only what they want to hear, rather than face all that is being said."

Of habitual secretiveness, Nirenberg brought out the fact that many people withhold information "unrealistically out of a vague feeling that the less another person knows about what they are thinking, the better."

How to Succeed: After painting a black picture for SAACI members whose livelihood depends on communicating with people, Nirenberg indicated a way out. "There are ways to overcome those unfortunate human tendencies, so that you and the other person are thinking together rather than just exchanging words. When this happens, the salesman gets the customer's full appreciation of product benefits; the manager gets across what he wants to his salesmen and achieves a better rapport with them; and both manager and salesmen gain

the full advantages of their respective bosses' thinking, and of knowing that their bosses know theirs."

Nirenberg pointed to eight techniques for "getting through" to people and achieving a meeting of the minds:

(1) State your over-all objective first, begin the discussion with a statement of your objectives and put it in a motivational context—how you can save your contact money.

(2) Draw your contact out, help him to clear his mind of associated ideas that arise from your initial statement. This gives you an insight into his interests and preoccupations, causes your contact to think.

(3) Get the other person's reactions to your ideas, make him think about what you're saying.

(4) Express your understanding of the other person's position. Counter negative views with new arguments.

(5) Present your ideas one at a time, keep your speeches short and have your contact respond.

(6) Qualify disagreements by finding a common denominator for your differences. Show your contact that your differences aren't so big after all. Compare for him the value of his objection and of your argument, then ask him to take a position.

(7) Reduce emotional interference, let him blow off steam when he becomes angry. The pressure to express emotions interferes with rational thinking, often intrudes in discussions.

(8) Give and take in conversation. Both can be done while either talking or listening and both are necessary for a balanced, productive discussion.

"Remember," Nirenberg summarized, "the sale moves forward when the prospect, not you, is talking."

Emphasis on Communications: Other experts on the day-long program dealt with the broad area of communications between the salesman and the home office. Eastman Chemical Products' vice-president J. E. Magoffin called for management-to-field feedback of information, and Coleman Finkel, executive vice-president, Executive Communications, Inc., stressed the advantages of good report writing.

Magoffin pointed out that the sales-



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REFRIGERATION PRODUCTS FIRE FIGHTING EQUIPMENT INDUSTRIAL CHEMICALS

Property Data*		
Molecular weigh	it	136.1
<b>Boiling point (at</b>	760 mm. Hg.)	238°C
Melting points**		(1) 38-39°C
	*	(2) 3°C.
Specific gravity	(liquid) 25°/25°	
Specific gravity	(solid) 25°/25°	1.258
Refractive index	n 20°D	1.560
Odor-burned, s	slightly phenolic	
Solubility in Hall	-slightly soluble	
Minimum purity		959
Appearance	white to	light tan soli
*Determination	s made on 99% pure mi	aterial
	crystalline forms	

#### SALES

man has many key responsibilities—representing the company, determining what products are wanted, deciding how best to use his time, and keeping an eye on the competition and the industry—that the home office can help him with by feeding back information on policy, developments, competition and marketing trends.

There must be an interchange of information between salesmen and the home office, Magoffin stressed. "We, therefore, come back to the most important line of communication—that between top management and the rest of the organization."

SAACI members indicated by their discussions and questions that the previously presented points on "getting through," management-field feedback. and report writing had been well taken. In the afternoon, they heard F. W. Steckmest, manager of Shell Oil Co.'s employee communications Dept., discuss his company's program for developing sales management. Balance of the afternoon was devoted to panel discussions on the duties of chemical salesmen, past, present and future. Luncheon speaker was Arno Johnson, vice-president and senior economist, J. Walter Thompson advertising agency, whose subject was setting our sights for marketing opportunities in the sixties.

#### DATA DIGEST

• Belt Conveyors: Handbook 2779 presents company's line of sectional belt conveyors, outlines selection considerations, gives basic engineering data on available capacities, structures, components, supports and idlers. Link-Belt Co. Dept. PR (Prudential Plaza, Chicago 1).

• Tetranitromethane: Data sheet gives basic physical properties and compares material with competitive chemicals in rocket propellents. Hummel Chemical Co. (90 West St., New York 6).

• PVP: Role of polyvinylpyrrolidone in minimizing toxicity and sensitivity in phenols through formation of molecular adducts is discussed in eight-page booklet. Uses in poisons, drugs, detergents and other toxic chemical formulations are suggested. Antara Chemicals, Dyestuff and Chemical Division, General Aniline & Film Corp. (New York).

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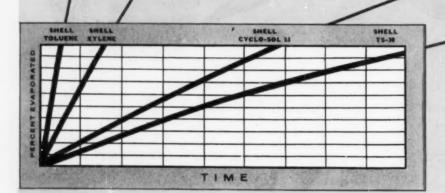
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# **Technology**

# Newsletter

CHEMICAL WEEK October 3, 1959 A polyolefin-fiber dyeing process was partially described last week by the French government's petroleum research institute—Institut Francais du Petrole (Paris). Polyolefin fiber, fabric or film is dipped in a chemical reagent (undisclosed) for one minute, rinsed to remove excess reagent, then dyed using "any acid or basic" colors. The reagent costs less than 30¢/lb. and is used in 10-20% concentration, the institute says. Best results are obtained with polypropylene. A French patent has been applied for, Japanese textile producers are showing interest, and U.S. polyolefin producers will also be contacted as prospective licensees, according to the institute.

Union Carbide will start work revamping its Brownsville plant (the old Carthage Hydrocol unit) next April. Carbide says the plant will make "solvents and intermediates to meet the needs of the many industrial customers, particularly . . . pharmaceutical and surface-coating industries."

Completion is scheduled for March '61. About 500 people will be employed in the construction work; about 200 in the plant operation. Both UCC's Chemicals Co. and Olefins Co. will have operations there.

Can prepackaged liquid rocket systems halt the swing to solids? They're making a strong bid—Thiokol's Reaction Motors Division (RMD) is already in pilot production of the prepackaged Guardian I and II units that are superseding solid propellent engines in the Navy's Sparrow and Bullpup airborne missiles. RMD should be tooled up for production at Bristol, Pa., within a few weeks.

Prepackaged means more than cans of rocket fuel, ready to go when the container seal is broken. These packages are complete motors—for the Sparrow and Bullpup, they are the rear third segment of the missile, complete with fins—and included are fuel and oxidizer tanks "wrapped around" the combustion chamber and thrust nozzle, and a solid-fuel actuator, which bursts open the "valves," then "pumps" the hypergolic fuel (spontaneously igniting contact with oxidizer).

Superior resistance to environmental extremes is claimed for the new motors, which use an inhibited nitric acid oxidizer and mixed amine fuel. The high-strength aluminum engines can withstand rough handling, have indefinite storage life.

The Guardians are very simple. But they still cost more than solid engines. The only moving part is a sliding shear member that opens the combustion chamber's fuel and oxidizer inlets. But the parts must be carefully machined, and assembly calls for flawless heliarc welding. Some other operations—epoxy sealing of the fuel tanks, and epoxy bonding of some external fittings—might, says RMD, "be improved."

Despite these drawbacks which have kept them from winning over solid units in every competition—RMD sees the prepacks as having long-

# **Technology**

### Newsletter

(Continued)

range potential, particularly with improved fuels. This confidence is reflected in the company's considerable investment in production equipment at Bristol. Scaled-up versions of the Guardian, with thrust of over 50,000 lbs., have been successfully tested.

A new drug for use in coronary artery disease is being clinically tested by The Merrell Co. division of Vick Chemical Co. It appears to suppress or inhibit the conversion of intermediates (probably 3-β-hydroxysteroids) into cholesterol in the body. Result: lower serum cholesterol, reportedly "striking improvement" in exercise tolerance and electrocardiographic tracings in some patients with angina pectoris. It's generically named triparanol, trademarked MER-29.

Two new approaches to cutting auto exhaust pollution. They are the work of University of California (Los Angeles) research engineer Richard Kopa. He is using an inexpensive mixing device mounted on top of the carburetor to inject additives into the air stream before combustion. The injected additives (1) lower the peak combustion temperature, eliminating 80% of the nitrogen oxide nomally produced in auto exhaust; (2) cut down unburned hydrocarbons, the other major smog-forming pollutant.

A way to make tungsten and molybdenum powders for commercial use in alloys (especially steels) has been developed by the Bureau of Mines laboratories in Reno, Nev. Key: a fused-salt-bath electrolysis that's reportedly far more economical than conventional processes.

The bureau says it has run successful tests on scheelite, the most common tungsten mineral, which usually contains undesirable molybdenum impurities. A one-step operation is said to have produced molybdenum of 98% purity and 99%-pure tungsten.

Radiation operating cost—a major hurdle to widespread industrial use of radiation in chemical processing—is brought down to "less than one-quarter" of the present level by a new accelerator, claims Applied Radiation Corp. (Walnut Creek, Calif.), designer of the machine. ARC is talking about its new L-band linear accelerator, designed specifically for production. Initial capital investment for a one-section machine (14 mev., 8 kw. at 10 mev.): approximately \$170,000.

The Pechiney process is now turning out ultrapure silicone—material with a boron content below 0.5 parts per billion, a resistivity above 800 ohm-cm. These figures put the product—manufactured by International Metalloids at Toa Alta, P. R., and sold by Grace Electronic Chemicals (Baltimore)—in the same ball-park as that made by Merck and soon to be produced by Monsanto and possibly Dow Corning and Du Pont (CW Technology Newsletter, Aug. 15). And Grace Electronic Chemicals adds that it is carrying out floating-zone refining and crystal growing, will offer single-crystal and custom-doped silicon as well as polycrystalline forms.



The severe, ill-fitting "envelope" bathing cap of former days is outmoded. Imaginative styling has taken over, to create a crown of beauty out of new polymers.

# Beauty-in and out of the swim

To achieve the cooling whites and becoming pastels the designer wants, compounders choose TITANOX\* white titanium dioxide pigments. TITANOX-RA in particular has really put white and tinted stocks in the swim.

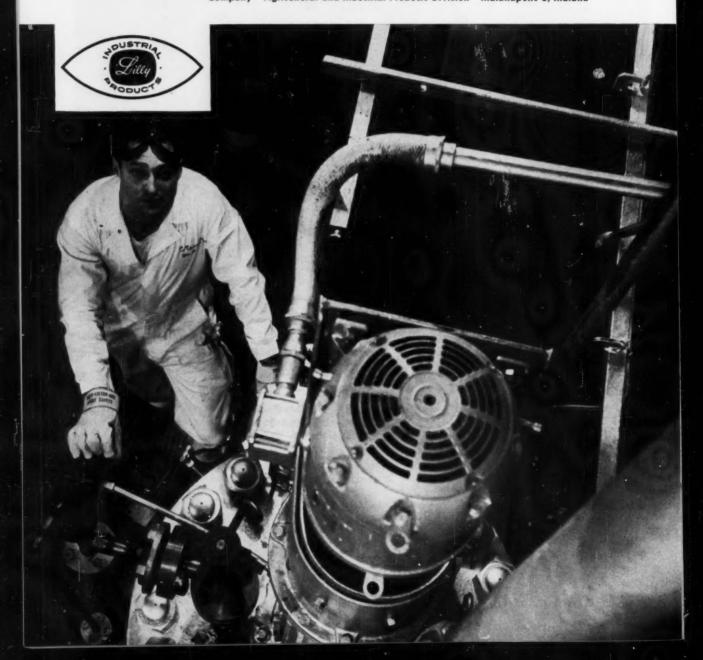
There are one or more types of TITANOX pigment—rutile, anatase or titanium-calcium—not only for rubber and plastics, but anything that needs white pigment...paint, paper, inks, ceramics, textiles, leather and building materials, to name some. Titanium Pigment Corporation, 111 Broadway, New York 6, N. Y.; offices and warehouses in principal cities. In Canada: Canadian Titanium Pigments Limited, Montreal.

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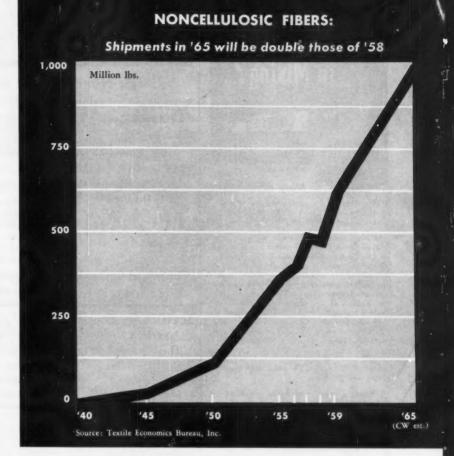
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# MARKETS

Twenty years of spectacular growth for noncellulosic synthetic fibers are plotted in the chart (right). The next five years should show an equally spectacular growth rate. Here are CW's findings on the outlook, with highlights from the recent Chemical Market Research Assn. meeting.



# **Noncellulosics Maintain Fast Growth Pace**

Last week, more than 200 market researchers and their wives converged on historic Williamsburg, Va., to discuss the mushrooming noncellulosic man-made fibers industry. Noncellulosic synthetics are expected to hit the 1-billion-lbs./year mark by '65—more than double the '58 figure.

This industry, only a little over 20 years old, consists essentially of the polyamides, polyesters and acrylic fibers, plus several smaller-volume fibers. In '58, total shipments for the group were 492 million lbs. This was the first year that these products had faltered in their growth—'58's total was 4 million lbs. less than '57's high.

However, demand is again on the rebound, and figures for the first six months of '59 show that shipments of noncellulosics hit 320 million lbs. At this record rate—which is expected to carry into the second half of '59—the total this year will be over the 600-million-lbs. mark.

Du Pont is the leading producer. In '59, textile fiber sales are expected to comprise one-third of the company's total sales volume, which will likely be over \$2 billion. And for the future, Du Pont already has projects under way that will raise its total fiber capacity to 600 million lbs./year by the early '60s. Most of this capacity will be for nylon (about 300 million lbs./year); acrylic output potential will be about 170 million lbs./year, and polyesters, 130 million lbs./year,

Nylon Still Tops: Polyamides-essentially nylon-accounted for 60% of over-all U.S. noncellulosic shipments in '58. Of the 304-million-lbs. nylon total, 277 million lbs. were yarn, and 27 million lbs. staple. For the first half of '59, demand for this group has been strong, with the second half of the year expected to be almost as good. Predicted total shipments for '59 will be in the 350-360-million-lbs. range. And, according to Paul W. Runge, of The Chemstrand Corp., nylon's growth rate in the future should continue to average out at about 13%/year-only slightly lower than the past seven years' growth rate.

Nylon finds outlets in many appli-

cations, and Runge estimated that, in '58, nylon was consumed in over 100 different end-uses. About half of the total volume goes into apparel and home furnishings, the rest for industrial applications.

Tire cord accounts for the major portion of industrial usage, consuming about 108 million lbs. of nylon in '58. In '58, nearly all aircraft and off-the-road tires sold had nylon cord, while 40% of replacement passenger tires, and 45% of replacement truck tires sold had nylon cords. The next big sales target is the original-equipment market. Currently, only 1% of original passenger tires and 25% of original truck tires have nylon cords. Rayon is still the largest tire-cord fiber, with about 250 million lbs. of cord consumed in '58.

One of the interesting points brought out during the CMRA discussion period was the fact that the often quoted ratio of 1 lb. of nylon to replace 1.7 lbs. of rayon in tire cords is not completely acceptable to rayon-fiber researchers. The rayon

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Many difficult jobs

The high speed, high shear principle employed in the Cowles Dissolver creates zones of intense turbulence within the material by direct mechanical action. The material is forced rapidly outward through itself, causing violent impact and shearing of particle against particle. This action, coupled with the ability of the exclusive power transmission system to deliver full power even at slow speeds results in great versatility and rapid ultimate dispersion of a wide variety of materials. Here are just a few examples—

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- Fruit juice concentrates—Cowles saves hundreds of man hours for manufacturers in fresh fruit dispersing operations. Improves end products, too.

These are only a few examples of the great variety of applications where Cowles Dis-solvers are now saving time and money for Chemical, Pharmaceutical, Drug, Cosmetic and Food manufacturers.

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MARKETS

# U.S. Noncellulosic Fiber Capacity-'59

(CW Estimate)

### POLYAMIDES\*

POLIAMIDES			
Company Allied Chemical American Enka Corp. The Chemstrand Corp. E. I. Du Pont**	Location Hopewell, Va. Enka, N. C. Pensacola, Fla. 1. Chattanooga, Tenn. 2. Martinsville, Tenn. 3. Seaford, Del. 4. Richmond, Va.	Tradename Caprolan Enka Nylor Chemstrand Du Pont Nylon	20 6.5
Industrial Rayon Corp.	Covington, Va.	IRC	10
Firestone†	Hopewell, Va.	Firestone	12
ACRYLICS			
American Cyanamid	Pensacola, Fla.	Creslan	27
The Chemstrand Corp.	Decatur, Ala.	Acrilan	45
E. I. Du Pont	Camden, S. C. Waynesboro, Va.	Orlon	80-90 40
Dow Chemical Co.	Williamsburg, Va.	Zefran	15-20
MODIFIED ACRYLICS			
Tennessee Eastman Co.	Kingsport, Tenn.	Verel	5
Union Carbide	South Charleston, W. Va.	Dynel	6-8
POLYESTER			
E. I. Du Pont	Kinston, N. C. Old Hickory, Tenn.††	Dacron	70-75 50-55
Tennessee Eastman Co.	Kingsport, Tenn.	Kodel	25
Beaunit Mills Inc.	Elizabethton, Tenn.	Vycron	10-12
Fiber Industries Inc.‡	Shelby, N. C.	Teron	40

\* Several smaller companies buy raw material and make filaments, staple, etc.

\* Plants listed according to size.

† Recently Announced; production due mid-'60. †† Not yet producing—Still under construction. ‡ Due onstream mid-'60.

spokesman's figure was closer to 1.3 lbs. of rayon for each pound of nylon. However, it was pointed out, that the cost of the tire to the consumer will probably be the real determining factor in the choice between the two fiber cords.

Acrylics Diversify: Acrylic fibers will continue their growth during '59, and production should hit the 155-165-million-lbs. range. Most of this growth will be due to renewed use in sweaters - about 50% of women's sweaters are made from acrylic fibers -plus diversification into such fields as rugs, carpets and blankets.

One of the significant facts about the acrylic family is that the physical properties of the fibers vary considerably, thus broadening their competitive field. Amos Ruddock of Dow Chemical pointed out the following examples: Orlon sells well in the apparel field-particularly in sweaters and jerseys-and for blankets, while Acrilan has been making great strides in carpeting and blankets. Creslan and Zefran are making hopeful showings in apparel, Verel looks promising in carpeting and pile fabrics, and Dynel



Ayres', Aerial Machine, designed by Dr. W. O. Ayres in 1885, was intended to get off the ground through compressed air generated by foot power. In this illustration of the machine, Brussel-Smith, noted graphic artist, has used his unique wood engraving technique to depict for this advertisement another of man's efforts to find the power necessary for sustained flight.

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Paper Converters — hot-melt quality coatings, at low cost; good grease and scuff resistance; single feed to automatic machines.

Dairy Carton Coaters — longer shelf life; reduced flaking, leaking and bulging.

**Food Packagers** – smarter package appearance – more gloss, less rub-off and scuff; improves printing at the same time.

**Box Makers** — interior coatings for corrugated cartons that eliminate

fibre scratch and need for costly liners; improved scuff, chemical, grease and moisture resistance; better gloss, no rub-off.

**Textile Finishers** — superb "hand" plus higher abrasion resistance, improved tear strength, extra crease resistance, reduced needle cutting; specially suitable for finishing washand-wear fabrics.

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- antismudge and scuff resistance.

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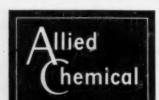
Film Extruders — faster extrusion rates, lower machine temperatures, easier gauge control; brilliant, uniformly colored films.

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### MARKETS

is doing well in knit-pile fabrics and industrial uses. Darvan also seems suited to knit goods.

More Polyester Producers: Du Pont, with Dacron, is the major polyester-fiber producer, with a plant at Kinston, N.C. A second unit is under construction at Old Hickory, Tenn. This year, both Beaunit Mills' Vycron, and Tennessee Eastman's Kodel are on the market. A fourth producer, Fiber Industries Inc., should have its brand-new Teron plant in operation by mid-'60. Fiber Industries is a joint venture between Imperial Chemical Industries, and Celanese. Marketing will be handled by Celanese.

During '58, polyester shipments dropped below '57 levels, however '59 shipments are again on the upswing and should hit a new high of about 65-70 million lbs.

According to Du Pont's James O. Graves, the largest segment of the polyester field is staple and tow, which has found major outlets in summer wear and more recently winterweight suits and slacks. Other large outlets are dresses, blouses, shirts, sportswear, etc. Blend of polyesters with other man-made fibers, and all natural fibers are also being widely used.

Polypropylene Coming Up? Polypropylene is currently receiving increased recognition as the next large-scale commercial fiber. Montecatini has been actively working on applications for polypropylene fiber (CW, Sept. 26, p. 35), and recently completed plans to build a 10-million-lbs./year plant at Neal, W. Va. Construction has not yet begun.

Major interest in this type of fiber is due to a ready supply of cheap raw materials, plus hope for a low-cost commercial fiber. Victor Erlich of Reeves Brothers, Inc., noted that with fuller commercialization of polypropylene, the price of the resin should come down into the 30-35¢/-lb. range. This level would be below that of most fiber-forming synthetic polymers and, as such, Erlich believes it will be hard to beat.

However, George Forstot, Union Carbide, questioned whether the final fiber product (i.e.—cost of goods at retail), would actually be lower than most fibers now on the market. Forstot felt that to get a commercially acceptable fiber, major additional cost would be needed (to achieve

# End-Use Breakdown of Noncellulosic-Fibers Shipments

(CW Estimate)

Group	'58	'59
Polyamides	304	350-360
Acrylics	108	160-170
Polyesters	55	65-70
Others*—	25	25-30

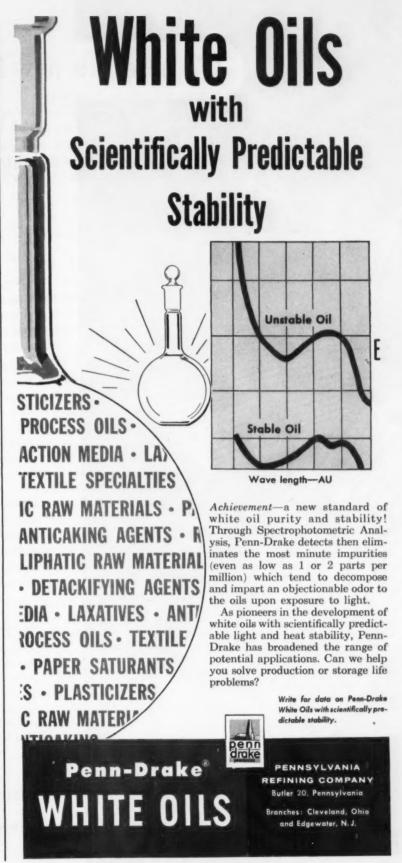
\* Polyvinylidene chloride, polyolefins and polyvinyl fibers

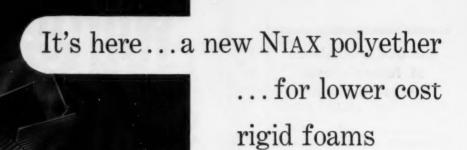
dyeability, good light stability and improved aesthetic appeal to consumers, not to mention the cost of promoting and advertising a new fiber in the U.S.).

Marketing Problems: The problems encountered in marketing a fiber are very much different from those usually encountered by the chemical manufacturer, according to R. L. Churchill, Eastman Chemical Products, Inc. Instead of dealing with one level of an industry, the fiber producer must carry through to the ultimate consumers. This involves dealing with and understanding the marketing problems of the yarn spinners, weavers and knitters, dvers and finishers, tailors and cutters, retail outlets, and the final consumer. This expanded marketing target means that the producer must not only be familiar with industrial marketing, but also consumer market-

These same problems also make the job of market research in the textile industry a very difficult one, said E. T. Powers, of Chemstrand, Powers pointed out that the market-research man must be familiar with each of the textile operations mentioned above, since a reluctance to handle a particular fiber at any one of these levels would greatly affect the future for a fiber. And with increased expenditures for advertising being used to market fibers, it becomes the added job of the market research department to gauge the effectiveness of an advertising campaign.

No doubt, the problems of marketing a new fiber are great, as well as expensive. But with the rapid growth of this industry even more chemical companies will be entering the fiber





Improved humid aging characteristics and reduced water absorption for rigid urethane foams are advantages you obtain by using a new Carbide polyether—Niax Triol LK-380. Developed by Carbide's research program on urethane intermediates, LK-380 produces a rigid urethane, lower in cost than polyester-based urethanes.

Wherever a low-density, foamed-in-place urethane polymer is required, LK-380 should be evaluated. It can be used in partial pre-polymer or one-shot systems. Applications for LK-380-based urethanes include insulation for refrigerators and freezers; acoustical tiles; fabrication of sandwich partitions for construction, non-sinkable boats, life buoys and deck guards.

Triol LK-380, like CARBIDE's other NIAX diols and triols, is made to rigid specifications, offering you custom control of urethane properties. They can help improve your flexible, semi-rigid, or rigid foams, elastomers, coatings, and adhesives. Order by tank car, tank truck, or in 55-gallon drums in carload or LCL lots. Remember, you save money on combination shipments in compartment tank cars and tank wagons.

Get specifications and other technical data on NIAX Triol LK-380 and other NIAX polyols from a Technical Representative in any CARBIDE office. Or write Dept. HW, Union Carbide Chemicals Company, Division of Union Carbide Corporation, 30 East 42nd Street, New York 17, N. Y.

# UNION CARBIDE CHEMICALS COMPANY

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# **Market** Newsletter

CHEMICAL WEEK October 3, 1959 This week another fumaric-acid producer quietly joins the nation's maleic-fumaric lineup to further hike the industry's capacity. Utah Resin Co. has been putting up a 2.4-million-lbs./year fumaric plant, at Salt Lake City, but the firm's activities have been virtually unnoticed behind recurrent flurries of competitive maneuverings of other producers (CW Market Newsletter, Sept. 5).

URC—only polyester resin producer in the Intermountain area—slates its entire fumaric output for captive use; the firm's current isophthalic polyester capacity is reportedly about 5 million lbs./year.

Utah Resin's principal markets are east of Salt Lake City—in Denver, Kansas City, St. Louis. URC President Robert Koch says economies of his process permit URC's isophthalic-type polyester resins to be sold for the same price as competing phthalic-based resins. Main features of the process: air oxidation of benzene to maleic, followed by conversion into fumaric acid. A modified fixed-bed catalyst—vanadium pentoxide charged with three new but undisclosed promoters—is expected to provide 80% yields (based on benzene).

has been making pilot-plant quantities of polypropylene "on a limited basis" has been making pilot-plant quantities of polypropylene for more than a year.

But this doesn't mean that Texas Eastman has become a bigvolume producer; a full-scale plant is yet to be constructed—after it's decided how much of the new plastic the company can hope to use and sell. Trade observers are guessing that Eastman will settle for a 20-25million-lbs./year unit, will have it in full production by mid-'60.

First fully integrated basic refractories plant in the South has been completed by H. K. Porter at Pascagoula, Miss. The \$12-million installation is designed to make 125 tons/day of magnesia (high-purity periclase) from sea water, includes a basic brick plant that converts periclase and chrome ore into basic refractories.

Unique plant features: periclase is briquetted after the first-step kiln operation and before the final dead-burning step; in the brick works, one man controls the entire batching operation from 60 bins that supply controlled sizes of component materials.

Czech production of important chemical products is revealed for the first time by Czechoslovakia's Chamber of Commerce; these output levels (metric tons) and percent increases over '57 records are reported:

Synthetic rubber, 908 (9.8%); polyvinyl chloride, 4,785 (20.8%); tar dyes, 4,213 (9.3%); fibers, 54,866 (14%); cellulose staple

# **Market**Newsletter

(Continued)

fiber, 39,740 (20.9%); phenolic plastics, 9,981 (3.8%); lithopone, 4,708 (5.1%).

The fibers production breakdown: viscose textile fibers, 9,738 tons, up 1%; polyamide silk, 1,038 tons, up 35.7%; viscose cord fibers, 3,906 tons, down 1.9% from '57.

Incidentally, the Czechs are elated over resumption of largescale glass buying by the U.S. The Czech Chamber of Commerce reveals that a \$900,000 glass order has been signed with U.S. buyers through Glassexport, foreign trade corporation. More big orders for plate glass and other glass products are anticipated.

Tabs on trimethyl orthoformate are reduced almost 30% by Kay-Fries Chemicals (New York) to a range from 76¢/lb. in tank trucks to \$1.35/lb. in less than drum quantities. The acetal ester—now in commercial-scale production along with its first cousin triethyl orthoformate—is expected to win sizeable markets in plastics applications.

Imports of noncellulosic fibers are rising. In first-half '59, more than 3.8 million lbs. (compared with 3.6 million lbs. in all of '58) of foreign-made noncellulosic fibers—yarns, filament, staple and tow—entered the U.S., plus 3.5 million lbs. of noncellulosic waste, noils, etc.

For U.S. producers, now working at record levels (see p. 75), the rash of imports means (1) narrowing of today's favorable net export balance, (2) more vigorous competition in foreign markets.

Another problem: fiber feedback. American manufacturers are licensing foreign producers to make noncellulosic fibers. Now some of this foreign-made material is being exported into the U.S., competing with licensees' domestic-made product.

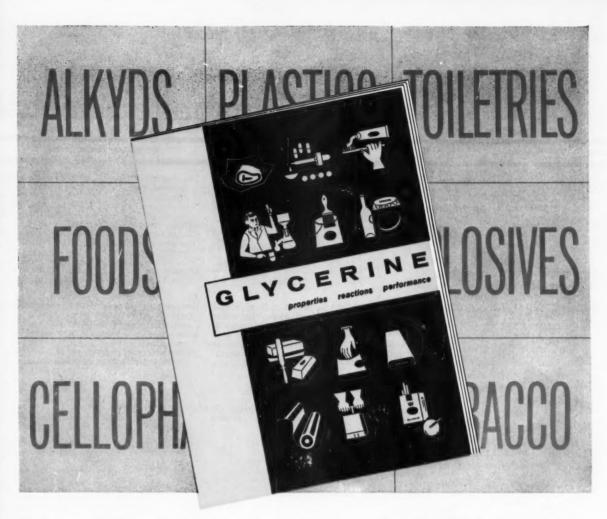
Largest foreign fibers exporters are West Germany (a large nylon producing country), Italy, and Japan, which now has eight acrylic plants.

The government will not act to limit fluorspar imports. Office of Civil and Defense Mobilization has reported: (1) domestic production is unnecessary to defense, since ample supplies are available from Canada and Mexico, (2) U.S. stockpiles are adequate, (3) import curbs would hurt Canada and Mexico.

### SELECTED PRICE CHANGES-WEEK ENDING SEPTEMBER 28, 1959

UP.	Change	New Price
Copper chloride, cupric, anhyd., dms.  Casein, imp., inedible, acid-precip., grd., Argentine, bgs., c.l.  DOWN		
Anisic aldehyde, dms.	\$0.15	\$1.55

All prices per pound unless quantity is quoted.



# New! Important data on Glycerine

"Glycerine Properties • Reactions • Performance" is a new twenty-page working booklet for anyone interested in glycerine. It describes all commercial grades and types. It covers storage, shipping and handling and a variety of glycerine's 1500 known applications.

For the chemist, this new booklet includes convenient technical data on hygroscopicity, vapor pressure,

solvent power, etc. These are presented under twelve subject headings with nine charts and tables. Reactions not found in older literature are described.

We'd like to send you a copy of "Glycerine Properties
• Reactions • Performance." It may suggest new areas
of usefulness to you. Address your request to the Glycerine Producers' Association.

### **Properties**

HYGROSCOPICITY . STABILITY

SOLVENT POWER . VISCOSITY

NONVOLATILITY . NONTOXICITY

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### **Applications**

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# SPECIALTIES

# **Automobile Finishes**

MAKER MODEL			RUST PREVENTION	OTHER PROTECTION				
	GENERAL MOTORS	CORVAIR (U)* BUICK (C)** CADILLAC (C) CHEVROLET (C) OLDSMOBILE (C) PONTIAC (C)	Alkali cleaner Two water rinses	Inaccessible (when assembled) stampings sprayed twice with zinc-based, weldable primer Narrow sections e.g., joint between wheelhouse and quarter panel zinc-chromated Cadillac factory undercoated Rocker panels, bottom of doors under wheelhouses zinc-chromated on all GM cars as final operation				
	CHRYSLER	IMPERIAL (C) DODGE (U) PLYMOUTH (U) VALIANT (U) CHRYSLER (U) DESOTO (U)	Kerosene handwash, zinc paste pit filling, alkali cleaning, two water rinses, phosphate coating, water rinse, chromic acid rinse, oven bake (10 minutes at 350 F)  Spray Operations (external and internal 19-in. depth)  Alkaline cleaning Water rinse Water rinse Water rinse Phosphate coating Water rinse Chromic conditioner rinse  Chromic conditioner rinse  Kerosene handwash, zinc paste pit filling, alkali cleaning, water rinse (10 minutes (20 minutes) (20 min	Undercoating standard, floors sealed with asphalt Caustic bathing of mill steel (three baths) Water-soluble drawing compound prior to stamping Undercoating standard on highest priced Chryslers, all others optional at extra cost				
		FORD (C) EDSEL (C) MERCURY (C)  LINCOLN (U) THUNDERBIRD (U)  FALCON (U)	Zinc-phosphate coating Water rinse Chromic-phosphoric rinse Dip to 20 in. above rocker panel in water-soluble primer  Alkaline cleaner	Front fenders phosphate-coated at stamping plant  Lincoln and T-Bird 90% undercoated at factory High zinc primer added in weld area Special metal shield to protect headlight area and front fender completely phosphated  Critical underbody parts galvanized and				
	AMERICAN MOTORS	AMERICAN (U) RAMBLER (U) AMBASSADOR (U)	Two water rinses Zinc-phosphate coating Water rinse Chromic-phosphoric conditioner rinse  Emulsion cleaner Water rinse Water rinse Zinc-phosphate cleaner equivalent to #97 Bonderite Water rinse Chromic conditioner rinse Dip in epoxy primer	high zinc primer used at weld points  All cars factory undercoated in critical area				
	STUDE- BAKER PACKARD	LARK (C) HAWK (C)	Phosphate cleaner Water rinse Phosphate cleaner Water rinse Chromic conditioner rinse	Inaccessible body stampings sprayed with welding primer All cars factory undercoated Chassis sprayed with black prime				

<sup>\*</sup>U indicates unitized construction.

\*\*C indicates separate chassis and body.

# What the New Models Will Wear

**EXTERNAL FINISH OPERATION** 

**MAJOR SUPPLIERS** 

Special (secret) "flash" primer for sides Primer surfacer: modified alkyd epoxy Reinforcing primer (different color) Oven bake (285 F for 45 min.) Wet sand Lacquer-type primer sealer on thin spots and all of sides Acrylic lacquer color to equivalent of three coats (2-2½ mils) Oven bake (30 min. at 200 F) Critical areas resprayed with aluminumfilled waxed-based alkyd resin material

Color: Du Pont, Rinshed-Mason, Forbes Primers: same Rust preventives: Parker, AmChem, Detrex

Knife glaze, vinyl seal seams, epoxy red prime, epoxy grey prime, oven bake (30 min. at 375 F), water sand, naphtha wash, high solid enamel sealer coat, oven bake (30 min. at 350 F) water sand, brush wash, two coats of high melamine resin, oven bake (35 min. at 260 F)

Epoxy primer coat

Color: Cook, Ditzler, Jones-Dabney, Du Pont, Rinshed-Mason Primers: same Rust preventives: Parker

Epoxy primer coat
Epoxy primer coat
Doven bake (350-370 F)
Wet sand and sealer
High melamine enamel coat
High melamine enamel coat
Oven bake at 250 F

Glaze solder joints
Red epoxy primer
Frey epoxy primer
Dven bake (30 min. at 380 F)
Wet sand
Two coats equivalent of high
melamine enamel
Dven bake (20 min. at 265 F)
Glaze solder joints
Red epoxy primer
Frey epoxy primer
Dven bake (30 min. at 300 F)
Wet sand
Two coats equivalent of high
melamine resin
Dven bake (30 min. at 265 F)
Same as Ford and Edsel

Primer: Herbert-Schoendorfer, Beckwith-Chandler, R. N. Nason (West Coast only) Color: own make, Rinshed-Mason, Jones-Dabney, Cook, Ditzler, Du Pont, R. N. Nason

Wet sand
Dven bake (10 min.
at 350 F)
Detail sanding and
touch-up
Dven bake (6 min.
at 280 F)
Scuff sanding
High melamine

enamel equivalent of two coats.
Oven bake (35 min. at 350 F)
Mask and scuff sand for two-tone jobs
Oven bake (35 min. at 225 F)
Reinforce internal coats with nonrust

Rust preventives: Parker and Penn Salt Paint: Du Pont, Cook, Jones-Dabney, Pittsburgh Plate Glass

I'wo epoxy primer coats sprayed electrostatically followed by hand touch-up Oven bake (35 min. at 325 F) Wet sand and sealer High melamine enamel equivalent to three coats. Two-tone cars get two coats Oven bake (35 min. at 265 F)

Undercoat: Du Pont Enamel: Cook, O'Brien GM's pint-sized Corvair went on sale this week in auto showrooms all over the country and with it rides GM's bid for a booming car year. The same hopes hold true for the rest of the car makers—they're betting on the small car to push sales in 1960 to the highest point in years. Just how will the looked-for boom in compact cars affect sales of chemical specialties for the auto-finishing industry? Despite the small cars' reduced paint requirements, the future looks promising for auto-finishing manufacturers.

Detroit's car makers are forecasting a 6.4-million-car year (domestic passenger vehicles). For the specialties industry, this means car makers will be buying about 12.2 million gal. of color paint alone, plus 250 million lbs. of the familiar sand, rubber and jute-based undercoat, as well as high gallonages of sealers, primers and mineral spirits.

Of the 6.4-million cars predicted for '60, some 2.3 million, including foreign imports, will be small ones. GM expects its Corvair sales to hit 350,000. Ford is predicting a similar market for its new entry in the small-car field, the Falcon. Chrysler is counting on sales of 200,000 for its new, compact Valiant. American Motors expects its Rambler to outsell all other small cars in the forthcoming auto year—looking to sales of 500,000—and Studebaker predicts it will sell 200,000 Larks.

There's no doubt that the small cars will be using less paint than regular models. Studebaker figures that it needs 134 gal. of color enamel, one gal. of primer, and 39 lbs. of undercoating on each of its Larks. Comparisons aren't particulary valid, but standard-size vehicles have, in the past, taken about 2 gal. finish coat, 1½ gal. primer, ½ gal. interior coat.

Plug for Corrosion Protection: Even if paint sales drop a little, makers of other finishing materials can start looking for a boom. More attention will be given to corrosion inhibitors this year than ever before in auto history because of the switchover to unitized body construction. This type



### LINKS IN THE MILLI-MU WORLD

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### **COMMUNICATING CARBON**

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### SPECIALTIES

of body, with various nooks and crannies that cannot be cleaned once the pieces are put together, is vulnerable to attack by residual water and particularly chloride-laden icemelting and dust-control compounds.

The trend shows up in a close look at the new Chrysler line.

Chrysler claims to have spent \$18 million on new rust-preventive and painting systems in all its assembly plants. The complex process subjects each car to three metal-cleaning baths, seven anticorrosion dips, and seven external paint-finishing operations. The anticorrosion phase alone takes one hour and forty-five minutes in a 2,300-ft. tunnel.

The rust-proofing begins when the steel arrives from the mill. It is given three spray baths of caustic to remove all traces of oil and dirt. Next, a water-soluble drawing compound is coated on the metal as it heads into blanking and stamping operations.

The assembled body is then bathed in a tank of alkaline cleaner to a depth of 18 in. while concentrated alkaline sprays soak the upper portion of the car. It is then drained for 50 seconds, a process repeated after all immersions. After two warmwater rinses, the body is immersed in a 130 F phosphate bath for 30 seconds while sprays of identical material coat the upper part of the car. Next step is a cool-water rinse, followed by immersion and spray with a chromic-acid-based conditioner. Then the body is drained and highpressure air is used to blast out all traces of the residual conditioner as the body moves into a drying oven of 250 F for three minutes. The rustpreventive sequence is completed as the cooled body passes into a final dip in a water-soluble zinc-phosphatebased primer.

Seven-Stage Painting: Finally, the body enters into a seven-stage external paint finishing operation which involves two coats of epoxy primer. oven baking at about 360 F, a thorough wet sanding, first and second coats of high melamine enamel, and lastly, oven baking again at 250 F.

Whether Chrysler's expensive anticorrosion operation will be adequate remains to be seen. Detroit's auto makers are only too aware, however, that more cars are junked because of corrosion than mechanical failure. The specter of losing customers is pushing auto makers into producing cars which will last much longer.

This year will find increased expenditures to protect vital but unseen areas of cars. Ford, for example, is galvanizing the underbody stampings of its Falcon, and is using a highzinc-content primer in the weld areas of all its models. GM has added a new and secret "flash" priming step to the sides of all models, in addition to the two normal stages of alkyd priming.

For further protection, GM has specified zinc chromate for the rocker panels, door bottoms and insides of fenders, in addition to a final two coats of a wax-based, aluminum-filled material in these areas. (In a normal year, its Fisher Body Division consumes 7.6 million gal. of lacquer, 3.5 million gal. of primers, and 9 million gal. of thinners and reducers.) American Motors remains alone in using a total body dip in epoxy primer, which coats the entire sheet-metal surface, inside and out.

De-emphasis on "No-Polish": As can be seen from the chart, procedures and materials for finishing passenger cars vary widely between makes and even models. All auto makers are adhering to high melamine "super enamels," except GM, which is continuing to use more costly acrylic lacquers. But one thing all companies are doing is softening claims that no polishing or waxing is needed. This is not because the paints are inferior or because of howls from polish makers. The soft pedal is due entirely to objections from dealers who count on considerable income from sale of polish jobs and materials. So owners' manuals in the '60 models will read in effect that "polish and waxing, while not absolutely necessary, will greatly assist in easy maintenance of the original finish."

Auto finishing continues to be a wide-open field to the imaginative supplier. Despite every effort of Detroit technology, still to be discovered are, for example: a cheap way to salvage the 50% of color liquid lost in the spraying process; finishes which will dry without baking; effective corrosion protection; water-based, nontoxic color materials; and reflective paints. A development in any one of these areas will open up excellent market possibilities.



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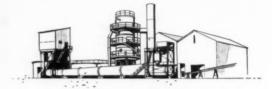
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# ADMINISTRATION



CW PHOTO-JACK RAMSDELL

Resources Research, Inc.'s Krackow and McCabe explain findings to assist in . . .

# Clearing the Haze in Pollution Battle

The Lakeland, Fla., area this week is emerging from the choking haze of badly handled industry-community relations. For 10 years the scene of serious and preventable air pollution problems, compounded with legal, health, and labor squabbles, Lakeland is just now beginning to take, and get, a brighter view of the triple superphosphate industry literally in its midst.

Source of the problem has been the immense clouds of dust and smoke arising from phosphate rock mining and milling, and from various operations tied to manufacture of sodium polyphosphates. Aside from the dust itself, sulfur dioxide (from sulfuric acid plants), steam, and fluorine-laden smoke have been emitted directly to the air.

Although rock has been mined and

milled near Lakeland since 1888, the problem really became serious in 1949, when Armour Agricultural Chemical Co. and Swift & Co. built the first trisodium phosphate operations. They were followed by five other plants, and three phosphate processing units.

And since 1955, when the industry approached its present capacity, a broad segment of Lakeland citizenry has complained. First, scattered grievances of citrus producers were aired, followed by complaints from cattlemen that fluorides were affecting their stock. Next citizens charged their health was being impaired. Soon after, the labor unions let it be known that their members were being subjected to unwarranted hazards. Capping the whole was a lawsuit brought in 1957 by cattleman Doyle Acree accusing

seven of the nine TSP makers with responsibility for fluorosis in his cattle. In short, the entire cast for a community relations tragedy was on stage.

Main Spur: Acree's case probably did more to dramatize the situation than any other thing, and to force improved pollution control. But it probably also hampered community relations efforts. For the outcome was that producers got into court, and their efforts to produce constructive data became a matter of legal controversy. Too, defense lawyers hesitated to allow companies to make any public statements because of the potential legal repercussions.

Against this backdrop, the companies—individually and later in concert—have slowly tried to develop a community relations program. Although today they are banded fairly solidly together in the Florida Phosphate Council, there was little or no cooperative effort early in the game. Indeed, CW's conversations with local people reveal that some companies in effect folded their arms and turned their backs, suggesting that there was no air pollution problem at all.

Owning Up: Now all companies admit there has been a problem all along, though none will comment on the extent of it. Some idea of its magnitude may be inferred, however, from numerous industry statements. Last January, for example, International Minerals & Chemicals Vice-President Floyd Bowen told the Florida Air Pollution Control Commission that by the beginning of 1959 "more than \$7 million would have been spent on modern waste control equipment in Polk and East Hillsborough Counties," principal producing areas of Florida. One company, Davison Chemical, division of W. R. Grace & Co., spent \$650,000 in 1954 on its original primary control equipment, has since installed about \$100,-000-worth more. Annual cost of operating the equipment runs between \$350,000 and \$400,000. Smith-Douglass Co. put its pollution control development costs at \$750,000. Cyanamid, even prior to startup in 1957, had spent considerable sums to find out background levels of pollution so that later operating standards could be set (CW, Dec. 1, '56, p. 60) has since put \$1 million into control equipment.

No Chance to Talk: The Acree case unquestionably agitated both companies and the public. But while the public had every opportunity to take potshots at the industry, the industry could not answer back effectively. Even the lawsuit failed to bring solidarity among them. Because several companies were already involved in antitrust matters, they were afraid to make any joint commitments.

Finally, however, attorneys from the various companies managed to act in concert, and hired a research firm, Resources Research, Inc., to act as defense consultants. RR was also directed to press research into the exact extent and nature of the pollution problem. Head of RR is former U.S. Public Health staff adviser Louis McCabe; the Florida project is directed by USPHS consultant Eugene Krackow. Even here, however, public

statements were seldom made because of the potential carryover into the lawsuits.

Still other factors complicated the matter. One TSP maker, American Cyanamid, was exempt from the trial, since it began operations after the period under litigation. This gave local plant management an unprecedented opportunity to speak freely about its own effective antipollution efforts. Though this raised Cyanamid's repute in the public eye, it did not please management of the other companies, also competing for public favor during these months.

Too, by this time, state government had stepped into the matter. A Florida Air Pollution Commission was finally set up in 1958 (CW, Jan. 10, p. 50) after widely publicized hearings. Its efforts were directed largely at Polk County; Polk is still the only county for which air pollution standards have been set.

Also sparking action has been a local Citizens Committee on Air Pollution organized by an electrical engineer and his wife, a woman apparently hypersensitive to fluorine and suffering extreme irritation from the pollutants.

Then again, the International Chemical Workers Union last year requested and got a U.S. Public Health survey in the plants; USPHS concluded that further intensive surveys were warranted.

Upshot: The upshot of all this has been much speculation about what would be done, wide publicity on the area's plight and a tremendous amount of incompetent public testimony in the various legal jousts.

Now, however, a sharper and brighter picture for both industry and citizenry is emerging, offering manifold opportunities for a concerted and concentrated community relations program. Details:

- In 60-90 days, laboratories of the pollution commission will report on studies to determine if the statutory standard of 40 parts per million of fluorine (dry weight basis) in forage crops is being met. Speculation is that industry will be shown to be complying with the laws.
- A survey released last fortnight by the Polk County Medical Society shows that not one case of those considered suspicious by local doctors could be traced to fluorosis, and that

no significant effects—good or bad have been found in children's teeth that could be laid to excessive fluorides in the area.

- Suits by Acree, in spite of testimony by local veterinarians that cattle have been affected by fluorides, have been settled—out of court, and mostly for legal costs.
- Findings by Resources Research, now completing the first third of its three-year study and able to talk for the first time since the lawsuits were started, show there is a downward trend in fluorine content of vegetation and forage crops. After continued study of between 11,000-14,000 citrus grove taggings and several hundred air sampling stations, it concludes that fluorine fallout averages well within the 40 ppm. standard. RR has set up a long-range program that includes studies of in-plant hazards to workers, cattle, dust fallout, and water.

All these factors indicate that before long the Lakeland area public should have sufficient information at its disposal to make its own judgments. How well the companies will put this information to work in establishing better relationships in the community remains to be seen. There's little question, however, that they're at last readying to present a brighter face to the public.

### LEGAL

Air Pollution Hearing: A South Carolina state legislative committee will hold a public hearing Oct. 14 at Columbia in another move to give that state an air pollution control law.

The hearing, which will be attended by industrial representatives—including several from chemical process industries—is of particular significance to CPI management. Air pollution has been the subject of much controversy in recent weeks, particularly in Charleston County. Result: county health department directives against several chemical concerns. Virginia-Carolina Chemical Co.'s plant at Charleston, for example, was asked to cease manufacture of a chemical allegedly causing odors offensive to local citizens.

Sponsors of antipollution legislation want laws they say will "prevent the state from making the same mistakes other states have made during periods of rapid industrialization."

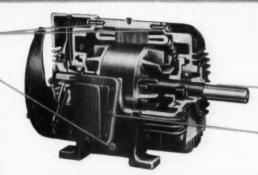


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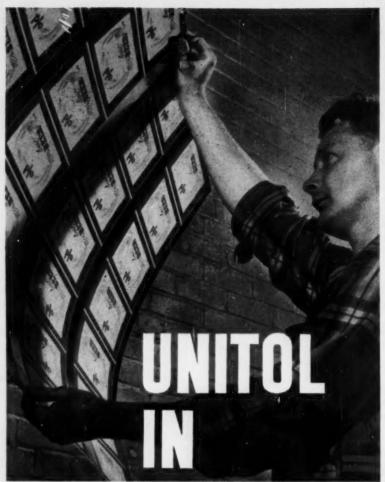




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Chemical Products Division

# UNION BAG-CAMP PAPER

CORPORATION 233 Broadway, New York 7, N. Y.

## ADMINISTRATION

Firemen's Suit: Eleven Charlotte, N.C., firemen injured in a fire and explosion in an abandoned building of the Charlotte Chemical Laboratories last July 9 have filed notice of intention to sue the chemical concern and a wrecking crew that was demolishing the building at the time of the disaster.

The firemen were burned when a tank of sodium hydroxide exploded.

Although preliminary proceedings filed in Mecklenburg County superior court did not indicate the specific amount of damages to be asked, it was estimated that the sum would total several hundred thousand dollars.

### KEY CHANGES

Henry K. Dice to vice-president-technical director, David D. Hecht to vice-president—product development, Robert H. Kampschulte to vice-president—sales, Ernest T. Lindsey to vice-president—manufacturing, all of Celanese Chemical Co., division of Celanese Corp. of America.

Orion. A. Jones, Jr., to controller, Chemical Products Division, Chemetron Corp. (Louisville, Ky.).

Peter T. Sinclair to director and member of the executive committee, King Wilkin to director and member of the executive committee, G. E. Young to director and senior vice-president, Crown Zellerbach Corp. (San Francisco).

**Sidney Wade** to vice-president — distributor products, Linde Co., division of Union Carbide Corp.

Charles E. Brookes to marketing manager, Organic Chemicals Division, Dewey and Almy Chemical Division, W. R. Grace & Co. (New York).

Ernest St. Louis to vice-president in charge of chemical manufacturing, Peter Benjamin to vice-president in charge of sales, Valchem (Langley, S.C.), division of United Merchants and Manufacturers, Inc.

### DIED

Peter J. Clarke, 56, assistant secretary and purchasing director, Rohm & Haas Co. (Philadelphia).

Thomas F. Rocco, 36, base manager for Aerojet-General Corp., Atlantic Missile Range (Cape Canaveral, Fla.).



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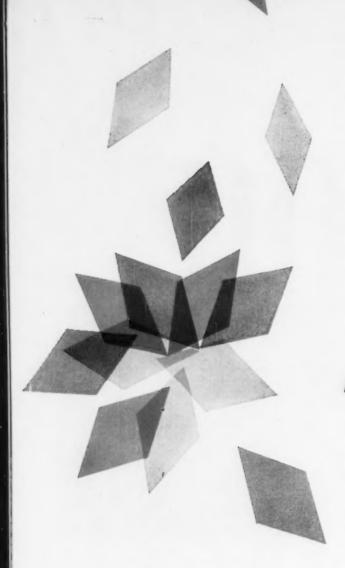
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# RESEARCH



'No conscience about U.S. drugs.'



Sloan-Kettering's Brown: 'Russian drug research is empirical.'

'Budgets are scheduled to rise.'

# Eyewitness Weighs Reds' Drug Research

The Russians aren't likely to "sputnik" the U.S. with new antibiotics in the next few years. Their drug research just isn't up to the quality now commonplace in U.S. drug firms, institutes, and other laboratories.

That's the conviction of biochemist George Brown, one of a four-man delegation\* recently returned from an inspection tour of USSR antibiotics research facilities in Moscow, Leningrad, and other cities.

Brown is head of the nucleoprotein division of Sloan-Kettering Institute for Cancer Research (New York) and a member of the board of trustees of the Gordon Research Conferences. At his laboratory-office, this week, he summed up his observations for CW—impressions that will be included in a joint report to the State Dept. later this year.

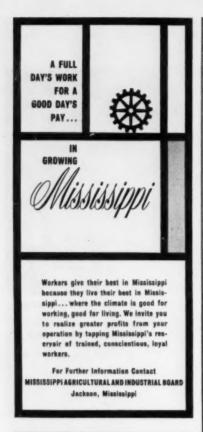
Root of the Soviet problem, according to Brown, is that most of the antibiotics research is applied rather than fundamental—"development (or redevelopment) of products already produced by the West." In the tour (arranged by the Foreign Relations Dept. of the Ministry of Health, USSR), Brown spotted "less than a dozen individuals having abilities or inclinations for fundamental research, and too many with pet theories or products."

Although the ministry's budget is scheduled to increase 20% each year, Brown reports "there is little indication that any broad fundamental research program can be built on the present base in, say, seven years."

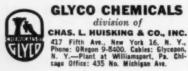
This may be explained by the relative scarcity of scientists in the 30-50 age group; few were trained during the war years. It also stems, in part, from Russian preoccupation with the Lysenko theory that environment affects heredity.

All this doesn't mean the USSR isn't already an economic threat to U.S. drugmakers. "The Soviets display no conscience about duplicating U.S. drugs without permission," says Brown, and selling them at cut rates

<sup>\*</sup>Including Fred Hahn (Walter Reed Chemical Center); Wayne Umbreit (Rutgers); Marvin Weinstein (Schering).







### RESEARCH

in world markets. While yields may be lower than in the U.S., the Russians can afford to produce themsince they have no internal competition. And the drugs assay well (e.g., samples supplied by the Ministry of Health contained 107-110% of the amount of antibiotic specified on the

Russians get their production facts from U.S. patents and literature, flesh them out through experimentation, since U.S. firms don't exchange production information with the USSR. This is one reason drugmakers are cautious about including Russia in the proposed International Health and Medical Research Act of 1959 (CW. Aug. 15, p. 37), a measure providing medical research assistance to other countries.

Nor does it mean the Russians aren't turning up new drug discoveries of some interest in their own labs. At the Institute for the Search for New Antibiotics, of the Academy of Sciences of the USSR, thousands of chemicals are being screened for anticancer activity. Mutamycin, a new antibiotic, has been found active against cancer in mice.

Others: Aurentium, apparently a version of actinomycin with different amino acid chains; Tricotycin, developed for use against a disease of cotton (the seeds are treated before planting).

Furthermore, the Russians are looking for new antibiotics, particularly against influenza, cancer, and viruses.

But this effort is largely empirical -cut and try-and not the basic work that leads to radically new chemotherapy, Brown reiterates. So, unless the emphasis changes, it's not likely that U.S. drugmakers will be soon feeling the pinch of legitimate Soviet competition.

# Drug Find

Medical men got a look at a novel type of drug last week that is effective against many infections but is neither an antibiotic nor a sulfonamide. Moreover, it is particularly lethal to Staphylococcus aureus, antibioticresistant cause of hospital epidemics in recent years.

Called Altafur, it is a nitrofuran. chemically 5-morpholinomethyl-3-(5nitrofurfurylideneamino) - 2 - oxazolidinone. It was described at a symposium on antibacterial therapy held by Michigan and Wayne counties' Academies of General Practice in Detroit's Sheraton-Cadillac Hotel.

Dr. Wayne Glas, director of surgery at Wayne County General Hospital in Eloise, Mich., reported that the drug, developed by Eaton Laboratories Division of the Norwich Pharmacal Co. (Norwich, N.Y.), cleared up 334 of 335 Staphylococcus aureus cultures. Dr. William Cleaver, Oklahoma City Clinic and the Wesley Hospital in Oklahoma City, found Altafur cured 54 of 59 children suffering from various infections, almost all of whom had tried antibiotics without effect.

# New Help for Miners

Major Australian mining, metallurgical and chemical companiesincluding those controlled or partly owned by foreign interests-have formed the Australian Mineral Industries' Research Association. Object of the new body, headquartered in Melbourne, is to develop new methods and processes for exploration, extraction and use of minerals. And it is expected to be particularly valuable to smaller companies unable to afford this type of research on their own. The AMIRA expects to keep in close contact with similar groups abroad.

### EXPANSION

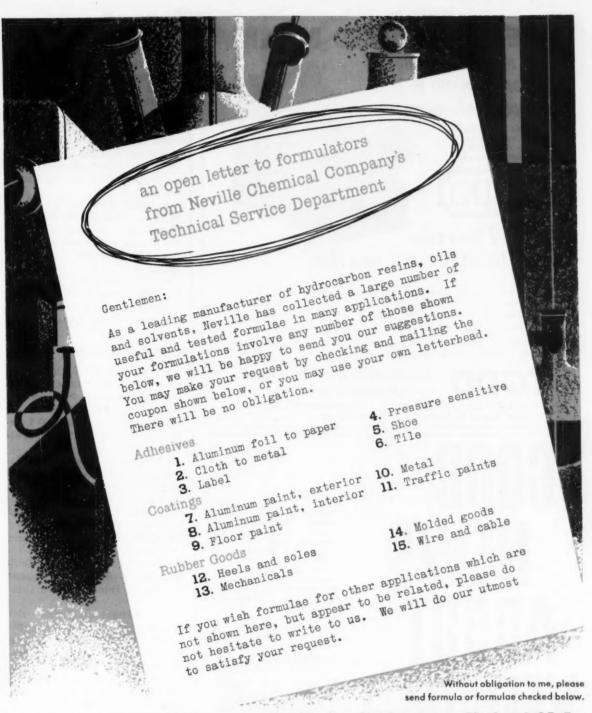
• Pitman-Moore Co. will build a \$1.5-million tissue-culture center at the company's biological laboratories near Zionsville, Ind. The firm now supplies three tissue-culture products (including Salk vaccine).

· Leeds and Northrup Co. has dedicated its new research and development center at North Wales, Pa. Building cost: \$1,718,000 or \$26.-45/sq. ft.

• Melpar, Inc. (Falls Church, Va.), a subsidiary of Westinghouse Air Brake Co., has formed a physical sciences laboratory, which will include a section for improving chemical materials for electronic applications.

· Colgate-Palmolive Co. will establish a multimillion-dollar research center adjacent to the Rutgers University science campus at New Brunswick, N.J. Completion date: late '61.

• Aluminum Co. of America (Pittsburgh) will spend upwards of



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### RESEARCH

\$30 million to build a new research and development center on a 2,400-acre tract at Merwin, Pa., 28 miles east of Pittsburgh. Alcoa, currently budgeting R&D at \$18 million/year, says the new center will ultimately be "the most comprehensive technical center of its kind ever built."

- Evans Research and Development Corp. (New York) has installed a new laboratory for radioisotope research.
- Atlantic Research Corp. (Alexandria, Va.) has acquired the A. M.
   Martin Co., precision equipment maker (e.g., optical autocollimators) located in Los Angeles County, California.
- The International Atomic Energy Agency will build a \$600,000 nuclear research laboratory at Seibersdorf, near Vienna, Austria.

### LITERATURE

- An eight-page directory listing about 250 reagents for medical research and biochemical analysis may be obtained from the Borden Chemical Co., Dajac Laboratories, 5000 Langdon St., P.O. Box 9522, Philadelphia 24, Pa.
- "Nonwoven Fabrics—an Unbiased Appraisal" is a study of fabrics produced through bonding individual fibers together by chemical, mechanical, or thermal means. It is published by Nonwovens Associates (P.O Box 328, Cambridge 39, Mass.). Price: \$15/copy.
- Arapahoe Chemicals, Inc. (Boulder, Colo.) offers a new booklet on "Organic Positive Bromine Compounds."
- A convenient process and equipment for converting metallic sodium into wire are described in a technical data sheet, "Laboratory Production and Use of Sodium Wire," now offered by U.S. Industrial Chemicals Co., division of National Distillers and Chemical Corp. (New York).

### REPORTS

These reports are available from the Office of Technical Services, U.S. Dept. of Commerce, Washington 25, D.C.:

• "Chemistry of Uranium: Collected Papers" (TID-5290, \$7.25) covers such subjects as preparation of

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# Chemical

Week



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"Lifetime" feeding study is being made on this rat by Mellon Institute staffer M. D. Woodside at the institute's new Bushy Run research facilities, 25 miles east of Pittsburgh. Toxicity of chemicals is tested both in single doses and in daily doses for the animal's lifetime. Mellon's Chemical Hygiene Fellowship recently moved into a new building (51 laboratories, offices and special research areas) at Bushy Run, is breeding 1,000 rat pups a week for its toxicity tests. The Fellowship, which investigates safe production, handling and use of chemicals, has been sponsored since '37 by the Union Carbide Chemicals Co., division of Union Carbide Corp.

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\$3,000,000 Liquidation-Chemical Plant at Orange, Texas. Type 316 Stainless Steel Tanks, Kettles, Heat Exchangers, Columns, Stills, Crystallizers, Centrifugals, Pumps, Valves, etc. Wonderful Values, Send for list. Perry Equipment Corp., 1415 N. 6th St., Philadelphia 22, Pa.

For Sale: Unused Buflovak Single Drum Vacuum Dryer, 5' dia. x 12' long, in whse., never installed. Cost new over \$40,000. Will Sacrifice at \$15,000 FOB. FS-2533, Chemical Week.

7'6" x 100' Long Dryer or Kiln, 1/2" shell. Very good condition. Must be moved. Very low price. Perry, 1415 N. 6th St., Phila. 22, Pa.

Tank Trailers for Chemicals Stainless Steel-new and used. Hackett Trade Co. Inc. P. O. Box 803, Packers Sta., Kansas City, Kas. MA 1-2363.

Bakelite BR-9432 Resin (Phenol-formaldehyde) (Orig. Bbls.) \$,33/lb. Carbon Tetrachloride Redist. & Restabilized. \$,075/lb. (Bulk). Barium Hydrox. N. F. (J. T. Baker Orig.) 15 Leverpaks \$,06/lb. Lacquer Thinner, Off Color \$,25/gal. (Bulk). Triethylene Glycol Dicaprylate—10 dra. \$,18. 30% Phthalic—70% Soya—10 dra. Carbitol Acetate—1 dr. FS-2737, Chemical Week.

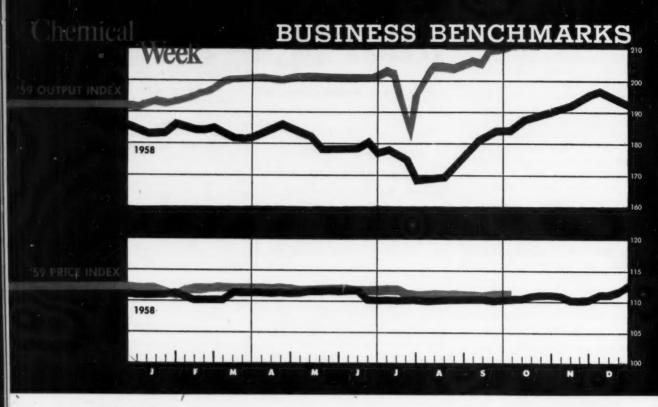
Elliot 16" Water Strainer No. 44052, \$500.00. W. L. Broaddus, Bx. 479. Phone GL 8-9844, Hopewell, Va.

### MISCELLANEOUS

To Employers Who Advertise for Men: The letters you receive in answer to your advertisements are submitted by each of the applicants with the hope of securing the position offered. When there are many applicants it frequently happens that the only letters acknowledged are those of promising candidates. (Others do not receive the slightest indication that their letters have even been receiver, much less given any consideration.) These men often become discouraged, will not respond to future advertisements and sometimes even question if they are bona fide. We can guarantee that Every Advertisement Printed Is Duly Authorized. Now won't you help keep our readers interested in this advertising by acknowledging every application received, even if you only return the letters of unsuccessful applicants to them marked say, "Position filled, thank you." If you don't care to reveal your identity, mail them in plain envelopes. We suggest this in a spirit of helpful co-operation between employers and the men replying to Positions Vacant advertisements. Classified Advertising Division, McGraw-Hill Publishing Company, "Put Yourself in the Place of the Other Fellow,"

# **OPPORTUNITIES**

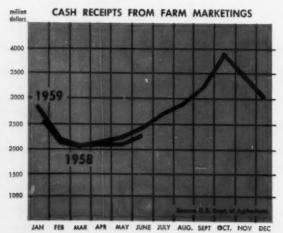
business; personal or personnel; financial; equipment; etc., may be offered or located through the classified advertising section of CHEMICAL WEEK. For more information, write to: CLASSIFIED ADVERTISING DIVISION P.O. Box 12 New York 36, New York.



**OCTOBER 3, 1959** 

| WEEKLY BUSINESS INDICATORS                           |    | Latest Week  | Preceding Week  | Year Ago |
|--|----|--------------|-----------------|----------|
| Chemical Week output index (1947-1949=100)           |    | 212.0        | 211.3           | 188.5    |
| Chemical Week wholesale price index (1947=100)       |    | 110.9        | 110.9           | 110.6    |
| Stock price index (12 firms, Standard & Poor's)      |    | 55.18        | 55.90           | 45.47    |
| Steel ingot output (thousand tons)                   |    | 359          | 356             | 1,816    |
| Electric power (million kilowatt-hours)              |    | 12,779       | 13.109          | 12,240   |
| Crude oil and condensate (daily av., thousand bbls.) |    | 6,823        | 6,813           | 7,087    |
| MONTHLY INDICATORS—Production (1947-1949=100)        | 4. | Latest Month | Preceding Month | Year Ago |
| All manufacturing                                    |    | 152          | 157             | 138      |
| Nondurable goods manufacturing                       |    | 146          | 146             | 133      |
| Durable goods manufacturing                          |    | 159          | 168             | 144      |
| Chemicals and allied products                        |    | 212          | 211             | 186      |
| Industrial chemicals                                 |    | 244          | 244             | 196      |
| Petroleum and coal products                          |    | 131          | 136             | 139      |

CHEMICAL CUSTOMERS CLOSE-UP.







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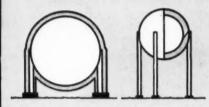
LIQUID

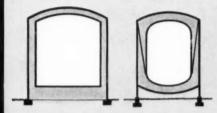
HYDROGEN

ITROGEN

320° F.

# LOW TEMPERATURE STORAGE VESSELS







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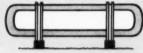
**OUTER SHELL** (carbon steel)

INSULATION SPACE

LIQUID LEVEL-

INNER SHELL (stainless, aluminum alloys or other alloys)

INNER TANK SUPPORTS (hold inner shell on small vessels. Enclosed columns used on larger vessels.)



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- Thompson Chemical Company—PVC
- The Pantasote Company—PVC
- Cary Chemicals, Inc.—PVC
- Atlantic Tubing and Rubber Company
   —PVC



The Pantasote Company,
Passaic, N. J.



Cary Chemicals, Inc., Flemington, N. J.

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